

СИММЕТРИИ КУБИЧЕСКИХ ГРАФОВ

П. В. Хворостов

Фрухт [1] доказал, что для всякой конечной группы существует связный регулярный граф степени 3, группа автоморфизмов которого изоморфна данной. Позднее Сабидусси [2] показал, что среди регулярных графов, не имеющих инвариантных относительно автоморфизмов вершин, содержатся графы с данной конечной группой и заданными теоретико-графовыми свойствами. В связи с этим при исследовании алгоритмов удобно выделять классы регулярных графов, поскольку они и достаточно представительны, и значительно уже класса всех возможных графов.

В работе рассматриваются кубические (регулярные степени 3) графы с числом вершин $4 \leq p \leq 14$. При нумерации вершин графа используется понятие канонических матриц смежности [3]. Матрице смежности $A = (a_{ij})$, $i, j = 1, p$, ставится в соответствие p^2 -мерный вектор $(a_{11}, \dots, a_{1p}, \dots, a_{p1}, \dots, a_{pp})$, и на множестве матриц одинакового размера вводится отношение линейного порядка $(a_{ij}) = A < A' = (a'_{ij}) \Leftrightarrow (a_{11}, \dots, a_{1p}, \dots, a_{p1}, \dots, a_{pp}) < (a'_{11}, \dots, a'_{1p}, \dots, a'_{p1}, \dots, a'_{pp})$, где старшинство определяется лексикографически.

Пусть S_p - симметрическая группа матриц-подстановок порядка p , тогда матрица $\bar{A} = \max_{g \in S_p} gAg^{-1}$ называется канонической.

Очевидно, что различные канонические матрицы соответствуют неизоморфным графам.

Графы, так же как в [4], упорядочены по убыванию канонических матриц смежности. В приложении I приведены следующие их характеристики: планарность, гамильтоновость, порядок и структура орбит группы автоморфизмов. В [4] для графов с $p = 8, 10, 12$ допол-

нительно вычислены плотность, неплотность, реберная связность, хроматическое число и хроматический класс. Установлено соответствие между исследуемыми графами и графами, диаграммы которых для $4 \leq p \leq 10$ приведены в [5], а для $p = 12$ - в [6]. Установлено соответствие исследуемых графов графам из [7], где для $4 \leq p \leq 14$ вычислены коэффициенты характеристического полинома, собственные значения, количество циклов различной длины, диаметр, связность, планарность, порядок группы автоморфизмов, и для $p \leq 12$ построены диаграммы графов. Графы в [7] упорядочены лексикографически по убыванию собственных значений, но такое упорядочение несколько неудобно, поскольку встречаются неизоморфные графы с одинаковыми спектрами. Для нахождения орбит и распознавания изоморфизма применялись алгоритмы [3,8]. В приложении 2 даны диаграммы графов.

Л и т е р а т у р а

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Характеристики графов

В первой колонке стоит порядковый номер графа, во второй - номер того же графа в [7], в третьей - номер графа в [5] для $p = 4, 6, 8, 10$ и номер графа в [6] для $p = 12$. Остальные колонки: P1 - планарность. Пн - гамильтоновость (знак "+" - означает наличие свойства, знак "-" - отсутствие), Г - порядок группы автоморфизмов, "Орбиты" - список нетривиальных орбит группы автоморфизмов.

| 1 | 2 | 3 | P1 | Пн | Г | Орбиты |
|----|----|----|----|----|----|--------------------------------|
| | | | | | | $p = 4$ |
| I | I | I | + | + | 24 | (1,2,3,4) |
| | | | | | | $p = 6$ |
| I | I | I | + | + | 12 | (1,2,3,4,5,6) |
| 2 | 2 | 2 | - | + | 12 | (1,2,3,4,5,6) |
| | | | | | | $p = 8$ |
| I | I | 4 | + | + | 16 | (1,2,7,8) (3,4,5,6) |
| 2 | 2 | 3 | + | + | 4 | (1,2,7,8) (3,6) (4,5) |
| 3 | 3 | 5 | - | + | 12 | (1,2,3) (4,5,6) (7,8) |
| 4 | 4 | I | + | + | 48 | (1,2,3,4,5,6,7,8) |
| 5 | 5 | I2 | - | + | 16 | (1,2,3,4,5,6,7,8) |
| | | | | | | $p = 10$ |
| I | I | 18 | + | - | 32 | (1,2,9,10) (3,4,7,8) (5,6) |
| 2 | 2 | I | + | + | 16 | (1,2,9,10) (3,4,7,8) (5,6) |
| 3 | 3 | 3 | + | + | 4 | (1,2) (3,4) (5,6) (8,9) |
| 4 | 4 | 2 | + | + | 8 | (1,2) (3,4) (5,6) (7,8,9,10) |
| 5 | 5 | 5 | - | + | 16 | (1,2) (3,4) (5,6) (7,8,9,10) |
| 6 | 6 | 7 | + | + | 2 | (1,10) (2,9) (3,8) (4,7) (5,6) |
| 7 | 7 | 6 | + | + | 4 | (1,2,9,10) (3,6) (4,5,7,8) |
| 8 | 8 | 10 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) |
| 9 | II | 8 | - | + | 8 | (1,2,9,10) (3,6) (4,5,7,8) |
| 10 | 9 | 9 | - | + | 12 | (1,2,3,8,9,10) (4,5,6) |
| 11 | 12 | 12 | + | + | 6 | (1,2,3) (4,5,6) (7,8,9) |
| 12 | 13 | 4 | + | + | 6 | (1,7,8) (2,3,5,6,9,10) |
| 13 | 14 | II | - | + | 2 | (2,3) (5,6) (7,8) (9,10) |
| 14 | 10 | 16 | - | + | 48 | (1,4,5,6,9,10) (2,3,7,8) |

| I | 2 | 3 | Pl | Ha | Г | О р б и т ы |
|--------|----|----|----|----|-----|--|
| I5 | I5 | I4 | + | + | 20 | (I,2,3,4,5,6,7,8,9,I0) |
| I6 | I7 | I5 | - | + | 4 | (I,2) (3,4,5,6) (7,8,9,I0) |
| I7 | I6 | I3 | - | + | 20 | (I,2,3,4,5,6,7,8,9,I0) |
| I8 | I8 | I7 | - | + | 8 | (I,5,9,I0) (2,3,6,7) (4,8) |
| I9 | I9 | I9 | - | - | I20 | (I,2,3,4,5,6,7,8,9,I0) |
| P = I2 | | | | | | |
| I | I | 3I | + | - | I6 | (I,2) (3,4) (7,8) (9,I0) II,I2) |
| 2 | 2 | 30 | + | - | 8 | (I,2) (3,4) (7,8) (I0,II) |
| 3 | 3 | 32 | + | - | I6 | (I,2) (3,4) (7,8) (9,I0,II,I2) |
| 4 | 4 | 84 | - | - | 32 | (I,2) (3,4) (7,8) (9,I0,II,I2) |
| 5 | 5 | 26 | + | + | I6 | (I,2,II,I2) (3,4,9,I0) (5,6,7,8) |
| 6 | 6 | 25 | + | + | 4 | (I,2) (3,4) (5,6) (7,8) (I0,II) |
| 7 | 7 | 24 | + | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,I0,II,I2) |
| 8 | 8 | 56 | - | + | I6 | (I,2) (3,4) (5,6) (7,8) (9,I0,II,I2) |
| 9 | 9 | 23 | + | + | 32 | (I,2,II,I2) (3,4,9,I0) (5,6,7,8) |
| I0 | I0 | I8 | + | + | 8 | (I,2,II,I2) (3,I0) (4,9) (5,8) |
| II | I7 | 22 | + | + | 4 | (I,2) (3,4) (5,6) (8,9) (II,I2) |
| I2 | I8 | 20 | + | + | 2 | (I,2) |
| I3 | I9 | 58 | - | + | 8 | (I,2) (3,4) (5,6) (8,9) (II,I2) |
| I4 | 20 | I7 | + | + | 2 | (I,2) |
| I5 | 22 | I5 | + | + | 48 | (I,2,7,8,9,I0) (3,4,5,6,II,I2) |
| I6 | 23 | I6 | + | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2) |
| I7 | 27 | 72 | - | + | 8 | (I,2) (7,8) (9,I0) (II,I2) |
| I8 | 2I | 65 | - | + | 4 | (I,2) (9,I0) (II,I2) |
| I9 | 25 | I9 | + | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2) |
| 20 | 24 | 2I | + | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2) |
| 2I | 26 | 68 | - | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2) |
| 22 | 28 | 69 | - | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I2) |
| 23 | II | 29 | + | + | 4 | (I,I2) (2,3,I0,II) (4,9) (5,6,7,8) |
| 24 | I2 | 28 | + | + | 4 | (2,3) (5,6) (7,8) (9,I0,II,I2) |
| 25 | I3 | 64 | - | + | 8 | (2,3) (5,6) (7,8) (9,I0,II,I2) |
| 26 | I4 | 27 | + | + | I6 | (I,2,4,5,8,9,II,I2) (3,6,7,I0) |
| 27 | I5 | 70 | - | + | I6 | (I,2,4,5) (3,7) (6,I0) (8,9,II,I2) |
| 28 | 29 | 7 | + | + | 2 | (I,I2) (2,II) (3,I0) (4,9) (5,8) (6,7) |
| 29 | 30 | 5 | + | + | 2 | (I,I2) (2,II) (3,9) (4,I0) (5,8) |
| 30 | 3I | 2 | + | + | I | |

| I | 2 | 3 | Pl | Hm | Г | О р б и т ы |
|----|----|----|----|----|----|--|
| 31 | 32 | 47 | - | + | 2 | (II, I2) |
| 32 | 33 | I | + | + | 4 | (I, 2, 9, IO) (3, 6) (4, 5, II, I2) (7, 8) |
| 33 | 34 | 53 | - | + | 4 | (I, 2) (4, 5) (7, 8) (9, IO) (II, I2) |
| 34 | 37 | 46 | - | + | 2 | (9, IO) (II, I2) |
| 35 | 36 | 48 | - | + | 2 | (I, 2) (4, 5) (7, 8) (II, I2) |
| 36 | 38 | 4 | + | + | 2 | (I, 2) (4, 5) (7, 8) (9, IO) |
| 37 | 39 | 6 | + | + | 2 | (I, 2) (4, 5) (7, 8) (9, IO) (II, I2) |
| 38 | 40 | 45 | - | + | 2 | (I, 2) (4, 5) (7, 8) (9, IO) (II, I2) |
| 39 | 42 | 3 | + | + | I | |
| 40 | 43 | 44 | - | + | I | |
| 41 | 44 | 73 | - | + | 4 | (I, 2) (4, 5) (7, 8) (9, IO) (II, I2) |
| 42 | 45 | 7I | - | + | 8 | (I, 2) (4, 5) (7, 8) (9, IO) (II, I2) |
| 43 | 41 | 66 | - | + | I2 | (I, 2, 3) (4, 5, 6) (8, 9, IO) (II, I2) |
| 44 | 46 | II | + | + | I2 | (I, 2, 3, IO, II, I2) (4, 5, 6, 7, 8, 9) |
| 45 | 50 | 49 | - | + | 2 | (I, I2) (2, 9) (3, II) (4, IO) (6, 8) |
| 46 | 51 | 9 | + | + | 4 | (I, I2) (2, 3, 9, IO) (4, II) (5, 6) (7, 8) |
| 47 | 53 | IO | + | + | 2 | (2, 3) (5, 6) (7, 8) (9, IO) (II, I2) |
| 48 | 54 | 80 | - | + | 2 | (2, 3) (5, 6) (7, 8) (9, IO) (II, I2) |
| 49 | 55 | 63 | - | + | 2 | (2, 3) (5, 6) (7, 8) (9, IO) (II, I2) |
| 50 | 48 | 60 | - | + | 4 | (I, 4) (2, 7) (3, 8) (6, I2) (IO, II) |
| 51 | 57 | 40 | - | + | I | |
| 52 | 56 | 61 | - | + | 4 | (I, 2, 8, 9) (3, I2) (4, 5) (6, II) |
| 53 | 52 | 43 | - | + | 2 | (I, I2) (2, II) (3, 9) (4, 8) (5, 6) (7, IO) |
| 54 | 59 | 79 | - | + | 2 | (I, 2) (4, 5) (8, 9) |
| 55 | 61 | 38 | - | + | 2 | (I, 2) (4, 5) (8, 9) (IO, II) |
| 56 | 58 | 52 | - | + | 2 | (I, IO) (2, II) (3, 6) (4, 8) (5, I2) (7, 9) |
| 57 | 62 | 37 | - | + | I | |
| 58 | 60 | 8 | + | + | 4 | (I, 2, IO, II) (3, 6) (4, 5, 8, 9) (7, I2) |
| 59 | 63 | I2 | + | + | 24 | (I, 2, 3, 4, 5, 6, 7, 8, 9, IO, II, I2) |
| 60 | 64 | 62 | - | + | 4 | (I, 4) (2, 3, 7, 8) (5, 6, 9, II) (IO, I2) |
| 61 | 69 | 59 | - | + | 4 | (2, 3) (5, 6) (7, 8) (9, IO, II, I2) |
| 62 | 65 | 83 | - | + | 36 | (I, 2, 3, 7, 8, 9, IO, II, I2) (4, 5, 6) |
| 63 | 74 | 85 | - | - | I2 | (I, 2, 3) (4, 5, 6) (7, 8, 9, IO, II, I2) |
| 64 | I6 | 55 | - | + | 64 | (I, 2, 3, 5, 9, IO, II, I2) (4, 6, 7, 8) |
| 65 | 35 | 57 | - | + | I6 | (I, 5, 8, IO) (2, 3, II, I2) (4, 7) (6, 9) |
| 66 | 47 | 8I | - | + | I2 | (I, 5, 6) (2, 3) (4, 9, IO) (7, 8, I2) |

| I | 2 | 3 | Pl | Hm | Г | О р б и т ы |
|----|----|----|----|----|----|--|
| 67 | 49 | 67 | - | + | 4 | (2,3) (5,6) (7,8) (9,10) (II,12) |
| 68 | 70 | I4 | + | + | 8 | (I,2,II,12) (3,4,5,6,7,8,9,10) |
| 69 | 71 | 39 | - | + | 4 | (I,2) (3,4,5,6) (7,8,9,10) (II,12) |
| 70 | 75 | 35 | - | + | 2 | (3,4) (5,6) (7,8) (9,10) (II,12) |
| 71 | 66 | I3 | + | + | 24 | (I,2,3,4,5,6,7,8,9,10,II,12) |
| 72 | 67 | 5I | - | + | 24 | (I,2,3,4,5,6,7,8,9,10,II,12) |
| 73 | 68 | 54 | - | + | 4 | (I,2,3,5) (4,6,7,9) (8,10,II,12) |
| 74 | 73 | 4I | - | + | 8 | (I,2,II,12) (3,4,5,6,7,8,9,10) |
| 75 | 76 | 34 | - | + | 2 | (I,2) (3,6) (4,5) (7,10) (8,9) (II,12) |
| 76 | 72 | 76 | - | + | 16 | (I,2,3,5,9,10,II,12) (4,6,7,8) |
| 77 | 77 | 42 | - | + | 2 | (I,II) (2,12) (3,7) (4,9) (5,10) (6,8) |
| 78 | 78 | 50 | - | + | 8 | (I,5,10,II) (2,3,6,7) (4,8,9,12) |
| 79 | 79 | 82 | - | + | 2 | (I,II) (2,9) (3,12) (4,6) (5,10) |
| 80 | 80 | 36 | - | + | 4 | (I,9) (2,3,II,12) (5,10) (6,7) |
| 81 | 82 | 33 | - | + | 8 | (I,2,3,5) (4,6,7,10) (8,9,II,12) |
| 82 | 83 | 74 | - | + | 4 | (I,2,3,5) (4,6,7,10) (8,12) (9,II) |
| 83 | 8I | 78 | - | + | 48 | (I,2,3,4,5,6,7,8,9,10,II,12) |
| 84 | 84 | 75 | - | + | 16 | (I,2,II,12) (3,4,5,6,7,8,9,10) |
| 85 | 85 | 77 | - | + | 18 | (I,2,3,5,8,9,10,II,12) (4,6,7) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|----|----|----|----|----|--|
| | | | | | p = I4 |
| I | I | + | - | 64 | (I,2,I3,I4) (3,4,II,12) (5,10) (6,9) (7,8) |
| 2 | 6 | + | - | 16 | (I,2) (3,4) (7,8) (9,10) (II,12) (I3,I4) |
| 3 | 7 | + | - | 8 | (I,2) (3,4) (7,8) (9,10) (I2,I3) |
| 4 | 9 | + | - | 16 | (I,2) (3,4) (7,8) (9,10) (II,I2,I3,I4) |
| 5 | 10 | - | - | 32 | (I,2) (3,4) (7,8) (9,10) (II,I2,I3,I4) |
| 6 | I6 | + | - | 32 | (I,2) (3,4) (7,8) (9,10) (II,I2) (I3,I4) |
| 7 | I7 | + | - | 8 | (I,2) (3,4) (I3,I4) |
| 8 | I8 | + | - | 8 | (I,2) (3,4) (7,8) (10,II) (I3,I4) |
| 9 | I9 | + | - | 4 | (I,2) (3,4) |
| 10 | 20 | - | - | 16 | (I,2) (3,4) (7,8) (10,II) (I3,I4) |
| II | 2I | + | - | 4 | (I,2) (3,4) |
| I2 | 23 | + | - | 32 | (I,2) (3,4) (7,8) (9,10,II,12) (I3,I4) |
| I3 | 24 | + | - | 16 | (I,2) (3,4) (7,8) (9,10,II,12) (I3,I4) |
| I4 | 28 | - | - | 16 | (I,2) (3,4) (9,10) (II,12) (I3,I4) |

| I | 2 | Pl | Нш | Г | Орбиты |
|----|----|----|----|----|--|
| 15 | 22 | - | - | 8 | (I,2) (3,4) (II,12) (I3,I4) |
| 16 | 26 | + | - | 16 | (I,2) (3,4) (7,8) (9,10,11,12) (I3,I4) |
| 17 | 25 | + | - | 16 | (I,2) (3,4) (7,8) (9,10,11,12) (I3,I4) |
| 18 | 27 | - | - | 16 | (I,2) (3,4) (7,8) (9,10,11,12) (I3,I4) |
| 19 | 28 | - | - | 8 | (I,2) (3,4) (7,8) (9,10) (10,12) (I3,I4) |
| 20 | 2 | + | - | 32 | (I,2,13,I4) (3,4,11,12) (5,6,9,10) (7,8) |
| 21 | 3 | + | - | 8 | (I,2) (3,4) (5,6) (9,10) (12,13) |
| 22 | 4 | + | - | 16 | (I,2) (3,4) (5,6) (9,10) (11,12,13,14) |
| 23 | 5 | - | - | 32 | (I,2) (3,4) (5,6) (9,10) (11,12,13,14) |
| 24 | 30 | + | + | 16 | (I,2,13,I4) (3,4,11,12) (5,6,9,10) (7,8) |
| 25 | 31 | + | + | 4 | (I,2) (3,4) (5,6) (7,8) (9,10) (12,13) |
| 26 | 32 | + | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,10) (11,12,13,14) |
| 27 | 33 | - | + | 16 | (I,2) (3,4) (5,6) (7,8) (9,10) (11,12,13,14) |
| 28 | 34 | + | + | 16 | (I,2) (3,4) (5,6) (7,8) (9,10) (11,12) (I3,I4) |
| 29 | 35 | + | + | 4 | (I,2) (I3,I4) |
| 30 | 43 | + | + | 4 | (I,2) (3,4) (5,6) (7,8) (10,11) (I3,I4) |
| 31 | 44 | + | + | 2 | (I,2) |
| 32 | 45 | - | + | 8 | (I,2) (3,4) (5,6) (7,8) (10,11) (I3,I4) |
| 33 | 48 | + | + | 2 | (I,2) |
| 34 | 50 | + | + | 16 | (I,2) (3,4) (5,6) (7,8) (9,10,11,12) (I3,I4) |
| 35 | 51 | + | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,10,11,12) (I3,I4) |
| 36 | 55 | - | + | 8 | (I,2) (9,10) (11,12) (I3,I4) |
| 37 | 49 | - | + | 4 | (I,2) (11,12) (I3,I4) |
| 38 | 53 | + | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,10,11,12) (I3,I4) |
| 39 | 52 | + | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,10,11,12) (I3,I4) |
| 40 | 54 | - | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,10,11,12) (I3,I4) |
| 41 | 56 | - | + | 4 | (I,2) (3,4) (5,6) (7,8) (9,11) (10,12) (I3,I4) |
| 42 | 42 | + | + | 8 | (I,2) (3,4) (5,6) (7,8) (9,10) (12,13) |
| 43 | 46 | + | + | 16 | (I,2) (3,4) (5,6) (7,8) (9,10) (11,12,13,14) |
| 44 | 47 | - | + | 32 | (I,2) (3,4) (5,6) (7,8) (9,10) (11,12,13,14) |
| 45 | 57 | + | + | 2 | (I,2) |
| 46 | 58 | + | + | 4 | (I,2) (11,12) (I3,I4) |
| 47 | 59 | - | + | 8 | (I,2) (11,12) (I3,I4) |
| 48 | 60 | + | + | 8 | (I,2,13,I4) (3,12) (4,11) (5,10) (6,9) (7,8) |
| 49 | 62 | + | + | 8 | (I,2) (3,4) (5,6) (8,9) (12,13) |
| 50 | 64 | + | + | 2 | (I,2) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|----|-----|----|----|----|--|
| 51 | 89 | + | + | 4 | (I,2) (3,4) (5,6) (8,9) (II,12) (13,14) |
| 52 | 101 | - | + | 8 | (I,2) (3,4) (5,6) (8,9) (II,12) (13,14) |
| 53 | 61 | + | + | 16 | (I,2,13,14) (3,4,11,12) (5,6,8,9) (7,10) |
| 54 | 106 | + | + | 2 | (I,2) |
| 55 | 76 | + | + | 4 | (I,2) (12,13) |
| 56 | 107 | + | + | 2 | (I,2) |
| 57 | 109 | - | + | 4 | (I,2) (12,13) |
| 58 | 108 | + | + | 2 | (I,2) |
| 59 | 112 | - | + | 8 | (I,2) (3,4) (5,6) (8,9) (II,12) (13,14) |
| 60 | III | - | + | 4 | (I,2) (3,4) (5,6) (8,9) (12,13) |
| 61 | II3 | + | + | 4 | (I,2) (3,4) (5,6) (8,9) (12,13) |
| 62 | II4 | + | + | 2 | (I,2) |
| 63 | II5 | - | + | 2 | (I,2) |
| 64 | II6 | - | + | 4 | (I,2) (II,12) (13,14) |
| 65 | II7 | + | + | 4 | (I,2) (3,4) (5,6) (8,9) (II,13) (12,14) |
| 66 | II8 | - | + | 4 | (I,2) (3,4) (5,6) (8,9) (II,13) (12,14) |
| 67 | 66 | + | + | 16 | (I,2,13,14) (3,4,11,12) (5,6,8,10) (7,9) |
| 68 | II9 | + | + | 2 | (I,2) |
| 69 | 120 | + | + | 2 | (I,2) |
| 70 | 121 | + | + | 2 | (I,2) |
| 71 | 123 | - | + | 4 | (I,2) (13,14) |
| 72 | 90 | + | + | 16 | (I,2,7,8) (3,5) (4,11) (6,14) (9,10,12,13) |
| 73 | 91 | - | + | 32 | (I,2,7,8) (3,5) (4,11) (6,14) (9,10,12,13) |
| 74 | 77 | + | + | 8 | (I,2,7,8) (3,5) (4,11) (6,13) (10,14) |
| 75 | 128 | + | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,10) (12,13) |
| 76 | 131 | + | + | 8 | (I,2) (3,4) (5,6) (7,8,9,10) (II,12,13,14) |
| 77 | 132 | - | + | 16 | (I,2) (3,4) (5,6) (7,8,9,10) (II,12,13,14) |
| 78 | 137 | - | + | 4 | (I,2) (7,8) (II,12) (13,14) |
| 79 | 130 | - | + | 4 | (I,2) (9,10) (13,14) |
| 80 | 139 | + | + | 4 | (I,2) (7,8) (9,10) (II,12) |
| 81 | 140 | + | + | 4 | (I,2) (7,8) (9,10) (II,12) (13,14) |
| 82 | 141 | - | + | 4 | (I,2) (7,8) (9,10) (II,12) (13,14) |
| 83 | 138 | + | + | 2 | (I,2) |
| 84 | 145 | - | + | 2 | (I,2) |
| 85 | 152 | - | + | 8 | (I,2) (7,8) (9,10) (II,12) (13,14) |
| 86 | 67 | - | + | 16 | (I,2,13,14) (3,4,11,12) (5,6,8,10) (7,9) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|----|--|
| 87 | I22 | - | + | 2 | (I,2) |
| 88 | 92 | - | + | 16 | (I,2,II,I2) (3,8) (4,I4) (6,I3) (9,I0) |
| 89 | I24 | - | + | 4 | (I,2) (9,I0) (II,I2) (I3,I4) |
| 90 | I25 | - | + | 8 | (I,2) (9,I0) (II,I2) (I3,I4) |
| 91 | I27 | + | + | 4 | (I,2) (7,8) (9,I0) (I2,I3) |
| 92 | I26 | + | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (I2,I3) |
| 93 | I29 | - | + | 4 | (I,2) (3,4) (5,6) (7,I0) (8,9) (II,I3) |
| 94 | I33 | + | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2,I3,I4) |
| 95 | I35 | - | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2,I3,I4) |
| 96 | I34 | - | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2,I3,I4) |
| 97 | II0 | + | + | 8 | (I,2,I3,I4) (3,I2) (4,I0) (5,8) (7,II) |
| 98 | I44 | - | + | 2 | (I,2) |
| 99 | I36 | - | + | 2 | (I,2) |
| I00 | I46 | + | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I3) |
| I01 | I53 | + | + | 2 | (I,2) |
| I02 | I55 | - | + | 2 | (I,2) |
| I03 | I48 | + | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I3) (I2,I4) |
| I04 | I50 | - | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I3) (I2,I4) |
| I05 | I43 | - | + | 8 | (I,2) (3,4) (5,6) (7,9) (8,I0) (I2,I3) |
| I06 | I42 | + | + | 2 | (I,2) |
| I07 | I47 | - | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I2) |
| I08 | I51 | - | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I2) (I3,I4) |
| I09 | I49 | - | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I2) (I3,I4) |
| II0 | I54 | - | + | 2 | (I,2) |
| III | I56 | - | + | 2 | (I,2) |
| II2 | I57 | - | + | 4 | (I,2) (3,4) (5,6) (7,9) (8,I0) (II,I4) (I2,I3) |
| II3 | I58 | - | + | 4 | (I,2) (7,8) |
| II4 | I64 | - | + | 32 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2,I3,I4) |
| II5 | I59 | - | + | 2 | (I,2) |
| II6 | I60 | - | + | 4 | (I,2) (7,8) (I2,I3) |
| II7 | I61 | - | + | 2 | (I,2) |
| II8 | I63 | + | + | 4 | (I,2) (3,4) (5,6) (7,I0) (8,9) (II,I4) (I2,I3) |
| II9 | I66 | - | + | 8 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I4) (I2,I3) |
| I20 | I62 | + | - | 96 | (I,2,II,I2,I3,I4) (3,4,7,8,9,I0) (5,6) |
| I2I | I67 | - | + | 16 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2,I3,I4) |
| I22 | I65 | - | + | 8 | (I,2) (7,8) (9,I0) (II,I2,I3,I4) |
| I23 | I68 | - | - | 16 | (I,2) (3,4) (5,6) (7,8,9,I0) (II,I2,I3,I4) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|----|---|
| I24 | 8 | + | - | 8 | (I, I4) (2,3, I2, I3) (4, II) (5,6,9, I0) (7,8) |
| I25 | II | + | - | 8 | (2,3) (5,6) (9, I0) (II, I2, I3, I4) |
| I26 | I2 | - | - | I6 | (2,3) (5,6) (9, I0) (II, I2, I3, I4) |
| I27 | 36 | + | + | 4 | (I, I4) (2,3, I2, I3) (4, II) (5,6,9, I0) (7,8) |
| I28 | 37 | + | + | 4 | (2,3) (5,6) (7,8) (9, I0) (II, I2, I3, I4) |
| I29 | 38 | - | + | 8 | (2,3) (5,6) (7,8) (9, I0) (II, I2, I3, I4) |
| I30 | 63 | + | + | 2 | (2,3) (5,6) (7,8) (I0, II) (I3, I4) |
| I31 | 64 | + | + | I | |
| I32 | 65 | - | + | 4 | (2,3) (5,6) (7,8) (I0, II) (I3, I4) |
| I33 | 74 | + | + | I | |
| I34 | 78 | + | + | 4 | (2,3) (5,6) (7,8) (9, I0, II, I2) (I3, I4) |
| I35 | 82 | - | + | 4 | (9, I0) (II, I2) (I3, I4) |
| I36 | 75 | - | + | 2 | (II, I2) (I3, I4) |
| I37 | 80 | + | + | 4 | (2,3) (5,6) (7,8) (9, I0, II, I2) (I3, I4) |
| I38 | 79 | + | + | 4 | (2,3) (5,6) (7,8) (9, I0, II, I2) (I3, I4) |
| I39 | 8I | - | + | 4 | (2,3) (5,6) (7,8) (9, I0, II, I2) (I3, I4) |
| I40 | 83 | - | + | 2 | (2,3) (5,6) (7,8) (9, II) (I0, I2) (I3, I4) |
| I4I | I3 | + | - | 32 | (I, 2, 4, 5, II, I2, I3, I4) (3, 7, 9, I0) (6, 8) |
| I42 | I4 | - | - | 32 | (I, 2, 4, 5) (3, 7) (9, I0) (II, I2, I3, I4) |
| I43 | 39 | + | + | I6 | (I, 2, 4, 5, II, I2, I3, I4) (3, 7, 9, I0) (6, 8) |
| I44 | 40 | - | + | I6 | (I, 2, 4, 5) (3, 7) (6, 8) (9, I0) (II, I2, I3, I4) |
| I45 | 85 | + | + | 2 | (I, 2) (4, 5) |
| I46 | 93 | + | + | 8 | (I, 2, 4, 5) (3, 7) (6, I0) (8, 9, I3, I4) (II, I2) |
| I47 | I02 | - | + | 8 | (I, 2) (4, 5) (8, 9) (II, I2) (I3, I4) |
| I48 | 70 | + | + | 2 | (I, 2) (4, 5) |
| I49 | 68 | + | + | 4 | (I, 2, 4, 5) (3, 7) (6, I0) (9, I2) (I3, I4) |
| I50 | 72 | - | + | 8 | (I, 2, 4, 5) (3, 7) (6, I0) (9, I4) (I2, I3) |
| I5I | 87 | - | + | 4 | (I, 2) (4, 5) (8, 9) (I2, I3) |
| I52 | 95 | + | + | 8 | (I, 2, 4, 5) (3, 7) (6, I0) (8, 9, I2, I3) (II, I4) |
| I53 | I04 | - | + | 4 | (I, 2, 4, 5) (3, 7) (6, I0) (8, I2) (9, I4) (II, I3) |
| I54 | 96 | + | + | 8 | (I, 2, 4, 5) (3, 7) (6, I0) (8, 9, II, I3) (I2, I4) |
| I55 | 97 | - | + | 8 | (I, 2, 4, 5) (3, 7) (6, I0) (8, 9, II, I3) (I2, I4) |
| I56 | 69 | - | + | 8 | (I, 2) (4, 5) (7, 8) (9, I0) (II, I2, I3, I4) |
| I57 | 7I | - | + | 4 | (II, I2) (I3, I4) |
| I58 | 86 | - | + | 4 | (I0, II) (I3, I4) |
| I59 | I69 | + | + | 2 | (I, I4) (2, I3) (3, I2) (4, II) (5, I0) (6, 9) (7, 8) |
| I60 | I70 | + | + | I | |

| I | 2 | Pl | Нм | Г | О р б и т ы |
|-----|-----|----|----|----|--|
| I61 | I72 | + | + | 1 | |
| I62 | I73 | - | + | 2 | (I3,I4) |
| I63 | I71 | + | + | 2 | (I,I4) (2,I3) (3,II) (4,I2) (5,9) (6,8) (7,IO) |
| I64 | I77 | - | + | 2 | (I2,I3) |
| I65 | I74 | + | + | 1 | |
| I66 | I75 | + | + | 2 | (I,I4) (2,I2) (3,I3) (4,II) (5,8) (6,IO) (7,9) |
| I67 | I76 | + | + | 2 | (I,I4) (2,I2) (3,I3) (4,II) (5,8) (6,9) (7,IO) |
| I68 | I81 | + | + | 1 | |
| I69 | I82 | - | + | 2 | (II,I2) |
| I70 | I84 | - | + | 2 | (II,I2) (I3,I4) |
| I71 | I83 | - | + | 1 | |
| I72 | I89 | + | + | 1 | |
| I73 | I90 | + | + | 1 | |
| I74 | I91 | - | + | 1 | |
| I75 | I92 | + | + | 1 | |
| I76 | I96 | - | + | 1 | |
| I77 | I88 | - | + | 2 | (II,I2) (I3,I4) |
| I78 | I95 | + | + | 1 | |
| I79 | I97 | - | + | 1 | |
| I80 | I99 | - | + | 2 | (II,I2) (I3,I4) |
| I81 | I78 | + | + | 2 | (I,I4) (2,I3) (3,II) (4,I2) (5,IO) (6,8) (7,9) |
| I82 | I79 | - | + | 2 | (I3,I4) |
| I83 | 94 | - | + | 16 | (I,2,7,8) (3,II) (4,5) (6,I4) (9,IO,I2,I3) |
| I84 | 205 | + | + | 1 | |
| I85 | I85 | + | + | 4 | (I,2,9,IO) (3,6) (4,5,I3,I4) (7,8,II,I2) |
| I86 | 2I4 | - | + | 4 | (I,2) (4,5) (7,8) (9,IO) (II,I2) (I3,I4) |
| I87 | I93 | - | + | 2 | (I,2) (4,5) (7,8) (II,I2) (I3,I4) |
| I88 | 201 | - | + | 2 | (9,IO) (I3,I4) |
| I89 | 202 | + | + | 2 | (I,2) (4,5) (7,8) (9,IO) (II,I2) |
| I90 | 203 | + | + | 2 | (I,2) (4,5) (7,8) (9,IO) (II,I2) (I3,I4) |
| I91 | 204 | - | + | 2 | (I,2) (4,5) (7,8) (9,IO) (II,I2) (I3,I4) |
| I92 | 2I0 | - | + | 1 | |
| I93 | I86 | - | + | 4 | (I,2) (4,5) (7,8) (9,IO) (II,I2) (I3,I4) |
| I94 | 209 | - | + | 2 | (I,I4) (2,I2) (3,I3) (4,II) (5,8) (6,IO) (7,9) |
| I95 | 222 | - | + | 2 | (9,IO) (II,I2) (I3,I4) |
| I96 | 223 | - | + | 4 | (9,IO) (II,I2) (I3,I4) |
| I97 | I94 | - | + | 2 | (I,I4) (2,I3) (3,I2) (4,II) (5,IO) (6,8) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|---|--|
| 198 | 198 | - | + | 4 | (1,2,13,14) (3,10) (4,5,11,12) (7,8) |
| 199 | 207 | - | + | 4 | (1,2) (4,5) (7,8) (11,12) (13,14) |
| 200 | 218 | + | + | 2 | (1,2) (4,5) (7,8) (9,10) (12,13) |
| 201 | 221 | + | + | 1 | |
| 202 | 224 | - | + | 1 | |
| 203 | 235 | + | + | 2 | (1,2) (4,5) (7,8) (9,10) (11,12) |
| 204 | 245 | + | + | 2 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 205 | 246 | - | + | 2 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 206 | 247 | - | + | 2 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 207 | 217 | + | + | 2 | (1,14) (2,12) (3,13) (4,11) (5,8) (6,10) |
| 208 | 234 | - | + | 1 | |
| 209 | 229 | - | + | 1 | |
| 210 | 256 | + | + | 1 | |
| 211 | 243 | + | + | 1 | |
| 212 | 258 | - | + | 1 | |
| 213 | 227 | + | + | 1 | |
| 214 | 259 | - | + | 1 | |
| 215 | 233 | - | + | 2 | (12,13) |
| 216 | 244 | - | + | 2 | (12,13) |
| 217 | 232 | + | + | 2 | (1,14) (2,12) (3,10) (4,13) (5,8) (7,11) |
| 218 | 238 | + | + | 1 | |
| 219 | 271 | - | + | 1 | |
| 220 | 273 | - | + | 1 | |
| 221 | 269 | - | + | 1 | |
| 222 | 255 | - | + | 1 | |
| 223 | 266 | - | + | 1 | |
| 224 | 275 | - | + | 1 | |
| 225 | 279 | - | + | 1 | |
| 226 | 278 | - | + | 1 | |
| 227 | 277 | - | + | 1 | |
| 228 | 282 | - | + | 1 | |
| 229 | 283 | - | + | 1 | |
| 230 | 284 | + | + | 1 | |
| 231 | 236 | - | + | 8 | (1,2,9,10) (4,5,13,14) (7,8,11,12) |
| 232 | 237 | - | + | 8 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 233 | 268 | - | + | 2 | (1,2) (4,5) (7,8) (12,13) |
| 234 | 288 | + | + | 2 | (1,2) (4,5) (7,8) (9,10) (12,13) |

| I | 2 | Pl | Ha | Г | О р б и т ы |
|-----|-----|----|----|----|--|
| 235 | 267 | + | + | 2 | (1,9) (2,10) (3,6) (4,12) (5,14) (8,13) |
| 236 | 269 | - | + | I | |
| 237 | 272 | - | + | I | |
| 238 | 281 | - | + | 2 | (1,2) (4,5) (7,8) (12,13) |
| 239 | 280 | - | + | I | |
| 240 | 291 | - | + | I | |
| 241 | 270 | - | + | 2 | (9,10) |
| 242 | 290 | - | + | 2 | (1,2) (4,5) (7,8) (9,10) (12,13) |
| 243 | 294 | - | + | 2 | (9,10) (11,12) (13,14) |
| 244 | 295 | + | + | 2 | (1,2) (4,5) (7,8) (9,10) (11,13) (12,14) |
| 245 | 296 | - | + | 2 | (1,2) (4,5) (7,8) (9,10) (11,13) (12,14) |
| 246 | 298 | - | + | I | |
| 247 | 302 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) (11,12,13,14) |
| 248 | 299 | - | + | 2 | (9,10) (13,14) |
| 249 | 300 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) (11,12,13,14) |
| 250 | 301 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) (11,12,13,14) |
| 251 | 303 | - | - | 4 | (1,2) (4,5) (7,8) (9,10) (11,12,13,14) |
| 252 | 88 | - | + | 8 | (1,2) (4,5) (11,12) (13,14) |
| 253 | 206 | - | + | 4 | (1,2) (4,5) (13,14) |
| 254 | 103 | - | + | 16 | (1,2) (4,5) (7,8) (9,10) (12,13) |
| 255 | 253 | - | + | 2 | (1,2) (4,5) |
| 256 | 257 | - | + | 16 | (1,2,9,10) (3,6) (4,5,13,14) (7,8,11,12) |
| 257 | 228 | - | + | 4 | (1,2) (4,5) (7,8) (11,12) (13,14) |
| 258 | 240 | - | + | 8 | (1,2,13,14) (3,12) (4,5,9,10) (6,8) (7,11) |
| 259 | 242 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) (11,12) |
| 260 | 248 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 261 | 249 | - | + | 4 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 262 | 254 | - | + | 2 | (1,2) (4,5) |
| 263 | 216 | - | + | 8 | (1,2) (4,5) (7,8) (9,10) (11,12) (13,14) |
| 264 | 200 | - | + | 4 | (1,2) (4,5) (8,9) (11,12) (13,14) |
| 265 | 219 | - | + | 12 | (1,2,3,12,13,14) (4,5,6,8,9,10) (7,11) |
| 266 | 225 | - | + | 6 | (1,2,3) (4,5,6) (8,9,10) (11,12,13) |
| 267 | 230 | - | + | 2 | (2,3) (5,6) (9,10) (11,12) (13,14) |
| 268 | 231 | - | + | 2 | (2,3) (5,6) (9,10) (11,12) (13,14) |
| 269 | 226 | - | + | 12 | (1,2,3) (4,5,6) (7,8,9) (10,11,12) (13,14) |
| 270 | 99 | - | + | 16 | (1,4) (2,3,7,8) (5,6) (9,10) (11,12,13,14) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|---|--|
| 271 | 213 | - | + | 2 | (13,14) |
| 272 | 252 | - | + | 2 | (12,13) |
| 273 | 274 | - | + | 4 | (2,3) (5,6) (7,8) (9,10) (12,13) |
| 274 | 307 | + | + | 2 | (1,13) (2,14) (3,12) (4,10) (5,11) (6,8) (7,9) |
| 275 | 310 | - | + | I | |
| 276 | 322 | + | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) |
| 277 | 323 | + | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 278 | 324 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 279 | 331 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 280 | 312 | - | + | 2 | (1,14) (2,13) (3,10) (4,12) (5,11) (7,9) |
| 281 | 311 | - | + | 2 | (1,14) (2,13) (3,12) (4,10) (5,9) (6,8) (7,11) |
| 282 | 325 | + | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) |
| 283 | 327 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 284 | 313 | + | + | 2 | (1,14) (2,13) (3,10) (4,12) (5,9) (7,11) |
| 285 | 332 | - | + | I | |
| 286 | 326 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) |
| 287 | 329 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 288 | 328 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 289 | 321 | - | + | I | |
| 290 | 334 | - | + | I | |
| 291 | 338 | - | + | 2 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 292 | 211 | - | + | 4 | (1,4) (2,7) (3,8) (6,10) (11,14) (12,13) |
| 293 | 263 | + | + | 4 | (1,4,11,14) (2,7,10,13) (3,6,8,12) (5,9) |
| 294 | 260 | + | + | 2 | (1,13) (2,10) (3,9) (4,14) (5,6) (7,11) (8,12) |
| 295 | 261 | - | + | I | |
| 296 | 250 | + | + | 2 | (1,4) (2,7) (3,8) (6,12) (10,13) |
| 297 | 264 | - | + | 2 | (1,4) (2,7) (3,8) (6,12) (10,13) (11,14) |
| 298 | 341 | - | + | 2 | (1,2) (4,5) (8,9) (12,13) |
| 299 | 340 | - | + | I | |
| 300 | 292 | - | + | 2 | (13,14) |
| 301 | 320 | - | + | 4 | (1,2,12,13) (3,14) (4,5,8,9) (6,10) (7,11) |
| 302 | 344 | - | + | I | |
| 303 | 348 | - | + | I | |
| 304 | 336 | - | + | I | |
| 305 | 333 | - | + | I | |
| 306 | 342 | - | + | I | |
| 307 | 346 | - | + | I | |

| 1 | 2 | P1 | Hm | Г | О р б и т ы |
|-----|-----|----|----|---|--|
| 308 | 293 | - | + | 4 | (1,2) (4,5) (8,9) (12,13) |
| 309 | 368 | - | + | 2 | (1,2) (4,5) (8,9) |
| 310 | 335 | - | + | 4 | (1,2,13,14) (3,11) (4,5,8,9) (7,12) |
| 311 | 353 | - | + | I | |
| 312 | 343 | - | + | I | |
| 313 | 330 | - | + | 4 | (1,2,13,14) (3,12) (4,5,10,11) (6,7) (8,9) |
| 314 | 339 | - | + | 2 | (1,13) (2,12) (3,14) (4,9) (5,7) (6,11) |
| 315 | 345 | - | + | I | |
| 316 | 351 | - | + | I | |
| 317 | 350 | - | + | I | |
| 318 | 352 | - | + | I | |
| 319 | 306 | - | + | 2 | (10,11) |
| 320 | 314 | - | + | 8 | (1,2,8,9) (3,13) (4,5) (6,14) (10,11) |
| 321 | 381 | - | + | I | |
| 322 | 370 | - | + | 4 | (1,2,10,11) (3,6) (4,5,13,14) (7,12) (8,9) |
| 323 | 384 | - | + | 2 | (1,2) (4,5) (8,9) (10,11) (13,14) |
| 324 | 383 | - | + | I | |
| 325 | 337 | - | + | 2 | (1,13) (2,12) (3,14) (4,9) (5,7) (6,11) (8,10) |
| 326 | 386 | - | + | I | |
| 327 | 347 | - | + | 2 | (1,14) (2,9) (3,13) (4,12) (6,11) (8,10) |
| 328 | 395 | - | + | 2 | (10,11) (13,14) |
| 329 | 376 | - | + | I | |
| 330 | 367 | + | + | 2 | (1,13) (2,11) (3,9) (4,14) (5,6) (7,10) (8,12) |
| 331 | 372 | + | + | I | |
| 332 | 349 | + | + | 2 | (1,14) (2,9) (3,13) (4,12) (6,11) |
| 333 | 377 | - | + | I | |
| 334 | 366 | - | + | 2 | (1,2) (4,5) (8,9) |
| 335 | 387 | - | + | I | |
| 336 | 390 | - | + | 2 | (1,2) (4,5) (8,9) (13,14) |
| 337 | 398 | - | + | I | |
| 338 | 412 | - | + | 2 | (1,2) (4,5) (8,9) (10,11) |
| 339 | 407 | - | + | I | |
| 340 | 396 | - | + | I | |
| 341 | 416 | + | + | 6 | (1,2,8,9,13,14) (3,10,11) (4,5,12) |
| 342 | 417 | - | + | 2 | (1,2) (4,5) (8,9) (10,11) (13,14) |
| 343 | 401 | - | + | 2 | (1,10) (2,11) (3,6) (4,8) (5,14) (7,13) (9,12) |
| 344 | 375 | - | + | I | |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|----|--|
| 345 | 399 | - | + | I | |
| 346 | 39I | + | + | 2 | (I,10) (2,II) (3,6) (4,8) (5,14) (7,13) |
| 347 | 369 | - | + | 2 | (I,10) (2,13) (3,8) (4,6) (5,14) (7,II) |
| 348 | 385 | - | + | I | |
| 349 | 408 | - | + | I | |
| 350 | 397 | - | + | I | |
| 351 | 374 | - | + | I | |
| 352 | 409 | - | + | I | |
| 353 | 402 | - | + | 2 | (I,14) (2,12) (3,II) (4,9) (5,7) (8,13) |
| 354 | 4I9 | - | + | I | |
| 355 | 4I8 | - | + | I | |
| 356 | 309 | - | + | 4 | (1,2) (4,5) (8,9) (10,II) (13,14) |
| 357 | 373 | - | + | I | |
| 358 | 382 | - | + | I | |
| 359 | 422 | - | + | 2 | (1,2) (4,5) (8,9) |
| 360 | 42I | - | + | 4 | (1,2) (4,5) (8,9) (10,II) (13,14) |
| 361 | 357 | + | + | 4 | (1,4) (2,3,7,8) (5,6,9,II) (10,12,13,14) |
| 362 | 358 | - | + | 4 | (1,4) (2,3,7,8) (5,6,9,II) (10,12,13,14) |
| 363 | 359 | - | + | 4 | (1,4) (2,3,7,8) (5,6,9,II) (10,12,13,14) |
| 364 | 3I5 | - | + | 12 | (1,2,4,5,7,9) (3,8,10) (6,13,14) (11,12) |
| 365 | 403 | - | + | 2 | (1,4) (2,7) (3,8) (5,9) (6,13) (10,II) (12,14) |
| 366 | 4I4 | - | + | I | |
| 367 | 400 | - | + | 8 | (1,3,4,6,8,12,13,14) (2,7,10,11) (5,9) |
| 368 | 392 | - | + | 2 | (1,4) (2,7) (3,8) (5,9) (6,13) (10,11) |
| 369 | 425 | - | + | 2 | (1,4) (2,7) (3,8) (5,9) (6,13) (10,14) (11,12) |
| 370 | 458 | - | + | 12 | (1,2,3) (4,5,6) (7,8,9,10,11,12) (13,14) |
| 371 | 459 | - | + | 8 | (1,4) (2,3,7,8) (5,6,13,14) (9,10,11,12) |
| 372 | 460 | - | - | 8 | (1,4) (2,3,7,8) (5,6,13,14) (9,10,11,12) |
| 373 | 3I6 | - | + | 4 | (1,2) (4,5) (7,9) (8,10) (11,12) (13,14) |
| 374 | 276 | - | + | 8 | (2,3) (5,6) (7,8) (9,10,11,12) (13,14) |
| 375 | 437 | - | + | 4 | (2,3) (5,6) (7,8) (9,10,11,12) (13,14) |
| 376 | 428 | - | + | I | |
| 377 | 43I | - | + | I | |
| 378 | 445 | - | + | I | |
| 379 | 430 | - | + | I | |
| 380 | 438 | - | + | 4 | (2,3) (5,6) (7,8) (9,10,11,12) (13,14) |
| 38I | 439 | - | + | 4 | (2,3) (5,6) (7,8) (9,10,11,12) (13,14) |

| 1 | 2 | Pl | Нм | Г | О р б и т ь |
|-----|-----|----|----|-----|--|
| 382 | 440 | - | + | 4 | (2,3) (5,6) (7,8) (9,10,11,12) (13,14) |
| 383 | 432 | - | + | 4 | (1,2,8,10) (3,13) (4,5) (6,14) (7,9) (11,12) |
| 384 | 434 | - | + | 2 | (1,2) (4,5) (7,9) (8,10) (11,12) (13,14) |
| 385 | 435 | - | + | 2 | (1,2) (4,5) (7,9) (8,10) (11,12) (13,14) |
| 386 | 442 | - | + | 2 | (1,2) (4,5) (7,10) (8,9) (11,12) |
| 387 | 451 | - | + | 1 | |
| 388 | 405 | - | - | 4 | (1,2,13,14) (3,12) (4,5,8,9) (7,10) |
| 389 | 444 | - | + | 2 | (1,2) (4,5) (7,10) (8,9) (11,12) (13,14) |
| 390 | 443 | - | + | 2 | (1,2) (4,5) (7,10) (8,9) (11,12) (13,14) |
| 391 | 450 | - | + | 2 | (1,10) (2,8) (3,13) (4,5) (6,12) (7,9) (11,14) |
| 392 | 452 | - | + | 1 | |
| 393 | 317 | - | + | 24 | (1,2,3,7,9,11) (4,5,6) (8,10,12) (13,14) |
| 394 | 441 | - | + | 2 | (1,2) (4,5) (7,9) (8,10) (11,12) (13,14) |
| 395 | 455 | - | + | 2 | (2,3) (5,6) (9,11) (10,12) (13,14) |
| 396 | 449 | - | + | 4 | (1,14) (2,3,10,12) (4,8) (5,6) (7,13) (9,11) |
| 397 | 456 | - | + | 2 | (2,3) (5,6) (9,11) (10,12) (13,14) |
| 398 | 461 | - | + | 2 | (1,3) (4,6) (7,12) (8,11) (9,10) (13,14) |
| 399 | 466 | - | + | 6 | (1,2,3) (4,5,6) (7,8,9,10,11,12) (13,14) |
| 400 | 15 | - | - | 128 | (1,2,3,5,11,12,13,14) (4,6,9,10) (7,8) |
| 401 | 41 | - | + | 64 | (1,2,3,5,11,12,13,14) (4,6,9,10) (7,8) |
| 402 | 73 | - | + | 16 | (1,2,3,5) (4,6) (7,8) (10,11) (13,14) |
| 403 | 98 | - | + | 16 | (1,2,3,5) (4,6) (7,8) (9,10,11,12) (13,14) |
| 404 | 100 | - | + | 16 | (1,2,3,5) (4,6) (7,8) (9,10,11,12) (13,14) |
| 405 | 105 | - | + | 8 | (1,2,3,5) (4,6) (7,8) (9,11) (10,12) (13,14) |
| 406 | 180 | - | + | 8 | (1,11) (2,3,13,14) (4,8) (5,12) (6,10) (7,9) |
| 407 | 187 | - | + | 16 | (1,5,11,14) (2,3,12,13) (4,7,8,10) (6,9) |
| 408 | 208 | - | + | 4 | (1,5) (2,3) (4,7) (8,10) (11,13) |
| 409 | 215 | - | + | 2 | (2,3) |
| 410 | 212 | - | + | 4 | (1,5) (2,3) (4,7) (8,10) (11,13) (12,14) |
| 411 | 220 | - | + | 48 | (1,5,6,8,13,14) (2,3,11,12) (4,9,10) |
| 412 | 239 | - | + | 32 | (1,5,11,12) (2,3,13,14) (4,7,8,9) (6,10) |
| 413 | 285 | - | + | 4 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 414 | 286 | - | + | 4 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 415 | 287 | - | + | 4 | (2,3) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 416 | 308 | - | + | 2 | (2,3) |
| 417 | 297 | - | + | 2 | (2,3) |

| I | 2 | Pl | Нм | Г | О р б и т ы |
|-----|-----|----|----|----|--|
| 418 | 305 | - | + | 4 | (1,5) (2,3) (4,9) (8,12) (13,14) |
| 419 | 304 | - | + | 4 | (1,5) (2,3) (4,9) (8,14) |
| 420 | 318 | - | + | 8 | (1,6) (2,3) (4,10) (7,8,12,13) (11,14) |
| 421 | 319 | - | - | 24 | (1,5,6) (2,3) (4,9,10) (7,8,11,12,13,14) |
| 422 | 241 | + | + | 12 | (1,14) (2,3,4,11,12,13) (5,6,7,8,9,10) |
| 423 | 251 | - | + | 2 | (2,3) (6,7) (9,10) (11,12) (13,14) |
| 424 | 262 | - | + | 2 | (1,14) (2,13) (3,12) (4,10) (5,11) (6,9) (7,8) |
| 425 | 265 | - | + | 4 | (1,2,11,13) (3,6,7,9) (4,5,10,14) (8,12) |
| 426 | 360 | + | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 427 | 361 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 428 | 364 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 429 | 388 | + | + | 4 | (1,14) (2,13) (3,4,11,12) (5,6,9,10) (7,8) |
| 430 | 393 | - | + | 2 | (3,4) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 431 | 410 | - | + | I | |
| 432 | 389 | - | + | 4 | (1,14) (2,13) (3,4,11,12) (5,6,9,10) (7,8) |
| 433 | 394 | - | + | 2 | (3,4) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 434 | 411 | - | + | I | |
| 435 | 423 | - | + | 2 | (3,4) (5,6) (7,8) (9,10) (11,12) (13,14) |
| 436 | 354 | + | + | 28 | (1,2,3,4,5,6,7,8,9,10,11,12,13,14) |
| 437 | 356 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 438 | 355 | - | + | 28 | (1,2,3,4,5,6,7,8,9,10,11,12,13,14) |
| 439 | 378 | - | + | 2 | (1,3) (2,5) (4,7) (6,9) (8,11) (10,13) (12,14) |
| 440 | 362 | - | + | 4 | (1,2,3,5) (4,6,7,9) (8,10,11,13) (12,14) |
| 441 | 363 | - | + | 4 | (1,2,3,5) (4,6,7,9) (8,10,11,12) (13,14) |
| 442 | 380 | - | + | 2 | (1,5) (2,3) (4,9) (6,7) (8,12) (10,11) (13,14) |
| 443 | 365 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 444 | 415 | - | + | I | |
| 445 | 406 | - | + | 4 | (1,2,12,14) (3,6,11,13) (4,5,8,9) (7,10) |
| 446 | 413 | - | + | I | |
| 447 | 404 | - | + | 4 | (1,2,13,14) (3,6,11,12) (4,5,8,9) (7,10) |
| 448 | 426 | - | + | 2 | (1,2) (3,6) (4,5) (7,10) (8,9) (11,14) (12,13) |
| 449 | 462 | - | + | 8 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 450 | 447 | - | + | I | |
| 451 | 446 | - | + | I | |
| 452 | 448 | - | + | I | |
| 453 | 463 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,14) (12,13) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|----|--|
| 454 | 467 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,14) (12,13) |
| 455 | 436 | - | + | 8 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 456 | 464 | - | + | 4 | (1,2) (3,4,5,6) (7,8,9,10) (11,14) (12,13) |
| 457 | 465 | - | + | 8 | (1,2) (3,4,5,6) (7,8,9,10) (11,12,13,14) |
| 458 | 379 | - | + | 2 | (1,2) (3,5) (4,6) (7,8) (9,10) (11,12) (13,14) |
| 459 | 371 | - | + | 8 | (1,5,13,14) (2,3,10,11) (4,8,9,12) (6,7) |
| 460 | 420 | - | + | 2 | (1,14) (2,13) (3,12) (4,10) (5,11) (6,9) (7,8) |
| 461 | 424 | - | + | 2 | (1,14) (2,10) (3,13) (4,11) (5,12) (7,8) |
| 462 | 429 | - | + | 2 | (1,12) (2,10) (3,7) (4,14) (5,11) (8,13) |
| 463 | 427 | - | + | 2 | (1,11) (2,14) (3,7) (4,10) (5,12) (6,9) (8,13) |
| 464 | 433 | - | + | I | |
| 465 | 454 | - | + | 16 | (1,5,9,12) (2,3,13,14) (4,8) (6,7,10,11) |
| 466 | 457 | - | + | I | |
| 467 | 453 | - | + | 2 | (2,3) (6,7) (11,12) |
| 468 | 468 | - | + | I | |
| 469 | 470 | - | + | 2 | (1,5) (2,3) (4,8) (6,7) (9,13) (11,12) |
| 470 | 471 | - | + | 4 | (1,5) (2,3) (4,8) (6,7) (9,14) (10,11,12,13) |
| 471 | 472 | - | + | 4 | (1,5) (2,3) (4,8) (6,7) (9,14) (10,11,12,13) |
| 472 | 469 | - | + | 2 | (1,5) (4,8) (9,14) (10,11) |
| 473 | 473 | - | + | 4 | (1,14) (2,3,12,13) (4,11) (5,10) (6,7,8,9) |
| 474 | 474 | - | + | 2 | (1,13) (2,14) (3,12) (4,9) (5,10) (6,11) (7,8) |
| 475 | 475 | - | + | 2 | (1,14) (2,11) (3,13) (4,12) (5,10) (7,9) |
| 476 | 476 | - | + | I | |
| 477 | 477 | - | + | I | |
| 478 | 478 | + | + | 12 | (1,4,5,10,13,14) (2,3,8,9,11,12) (6,7) |
| 479 | 479 | - | + | 2 | (1,4) (2,9) (3,8) (5,13) (6,7) (10,14) (11,12) |
| 480 | 484 | - | + | 8 | (1,2,3,5) (4,6,7,10) (8,9,11,12) (13,14) |
| 481 | 490 | - | + | 2 | (1,2) (3,5) (4,6) (7,10) (9,11) (12,14) |
| 482 | 493 | - | + | 2 | (2,3) (6,7) (8,9) (11,12) (13,14) |
| 483 | 495 | - | + | 2 | (2,3) (6,7) (8,9) (11,12) (13,14) |
| 484 | 483 | - | + | I | |
| 485 | 488 | - | + | 2 | (1,9) (2,14) (3,13) (5,10) (6,12) (7,11) |
| 486 | 489 | - | + | 2 | (1,12) (2,14) (3,9) (4,7) (5,10) (6,13) (8,11) |
| 487 | 491 | - | + | 2 | (1,2) (3,5) (4,6) (7,10) (9,11) (12,14) |
| 488 | 485 | - | + | 4 | (1,2,3,5) (4,6,7,10) (8,12) (9,11) |
| 489 | 480 | - | + | 2 | (1,13) (2,14) (3,12) (4,8) (5,10) (6,9) |
| 490 | 494 | - | + | 2 | (1,12) (2,14) (3,7) (4,9) (5,11) (6,10) (8,13) |

| I | 2 | Pl | Hm | Г | О р б и т ы |
|-----|-----|----|----|-----|--|
| 491 | 492 | - | + | 2 | (1,5) (2,3) (4,10) (6,7) (8,12) (9,13) |
| 492 | 496 | - | + | 1 | |
| 493 | 481 | - | + | 8 | (1,2,3,5,9,11,13,14) (4,6,7,10) (8,12) |
| 494 | 498 | - | + | 2 | (1,3) (2,5) (4,7) (6,10) (8,13) (9,12) (11,14) |
| 495 | 482 | - | + | 8 | (1,2,3,5,9,11,13,14) (4,6,7,10) (8,12) |
| 496 | 500 | - | + | 2 | (1,5) (2,3) (4,10) (6,7) (8,13) (9,14) (11,12) |
| 497 | 486 | - | + | 4 | (1,2,3,5) (4,6,7,10) (8,12) (9,11,13,14) |
| 498 | 487 | - | + | 16 | (1,2,3,5,9,12,13,14) (4,6,7,10) (8,11) |
| 499 | 497 | - | + | 6 | (1,2,8,9,11,12) (3,5,7,10,13,14) (4,6) |
| 500 | 499 | - | + | 2 | (1,2) (3,5) (4,6) (7,10) (8,11) (9,12) (13,14) |
| 501 | 502 | - | + | 2 | (1,14) (2,11) (3,13) (4,9) (5,10) (7,12) |
| 502 | 503 | - | + | 4 | (1,2,10,11) (3,5,13,14) (4,6) (7,12) (8,9) |
| 503 | 501 | - | + | 4 | (1,2,13,14) (3,5,10,11) (4,6,8,9) (7,12) |
| 504 | 504 | - | + | 8 | (1,5,11,12) (2,6) (3,4,7,8,9,10,13,14) |
| 505 | 505 | - | + | 4 | (1,5) (3,4,7,9) (8,10,13,14) (11,12) |
| 506 | 506 | - | + | 8 | (1,5,11,12) (2,6) (3,4,7,8,9,10,13,14) |
| 507 | 507 | - | + | 12 | (1,14) (2,3,4,11,12,13) (5,6,7,8,9,10) |
| 508 | 508 | - | + | 14 | (1,2,4,5,10,11,14) (3,6,7,8,9,12,13) |
| 509 | 509 | - | + | 336 | (1,2,3,4,5,6,7,8,9,10,11,12,13,14) |

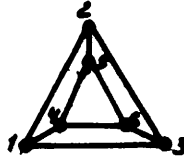
ДИАГРАММЫ ГРАФОВ

Все планарные графы изображены без пересечений ребер. Также учитывались сведения о симметриях графов.

$p = 4$

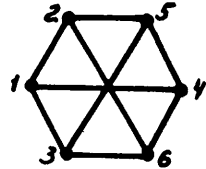


1. Тетраэдр.



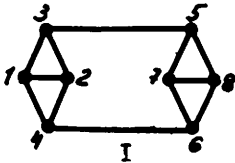
1. Призма.

$p = 6$

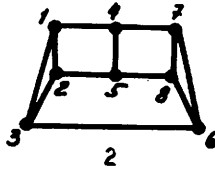


2. Лестница Мебиуса.

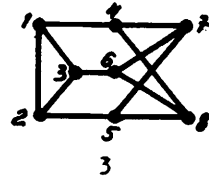
$p = 8$



1



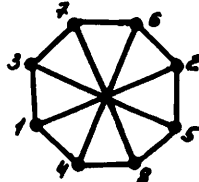
2



3

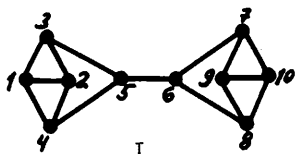


4. Призма.

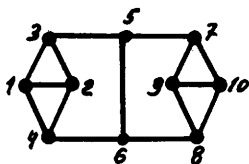


5. Лестница Мебиуса.

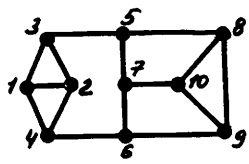
$p = 10$



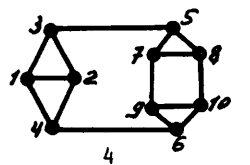
I



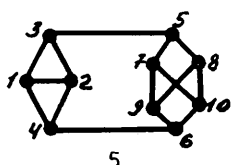
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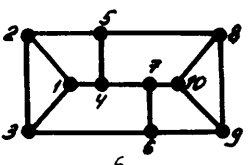
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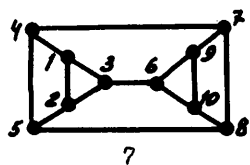
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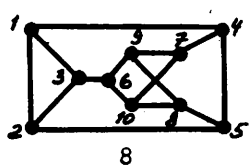
5



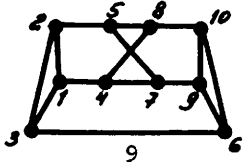
6



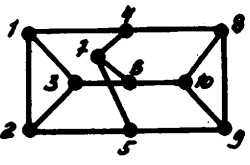
7



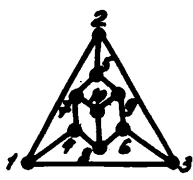
8



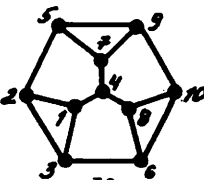
9



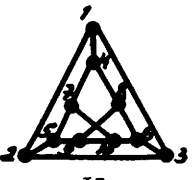
10



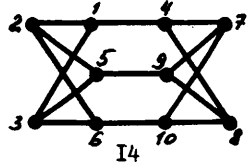
11



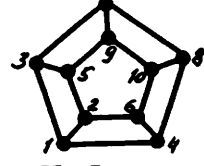
12



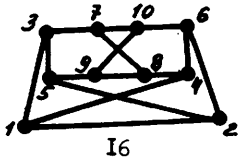
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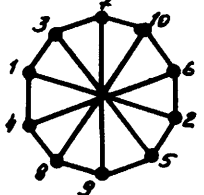
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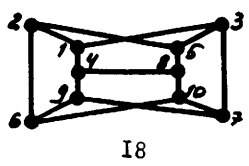
15. Призма.



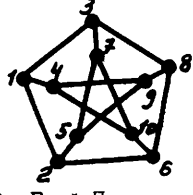
16



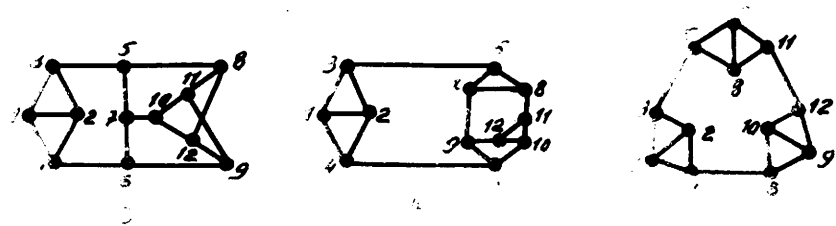
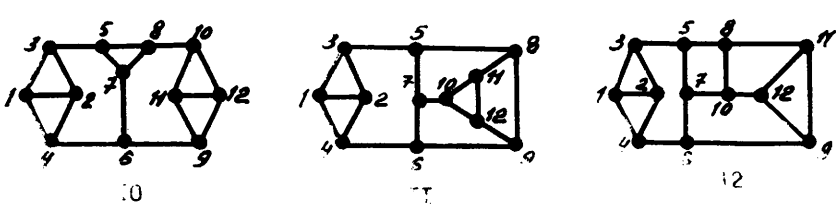
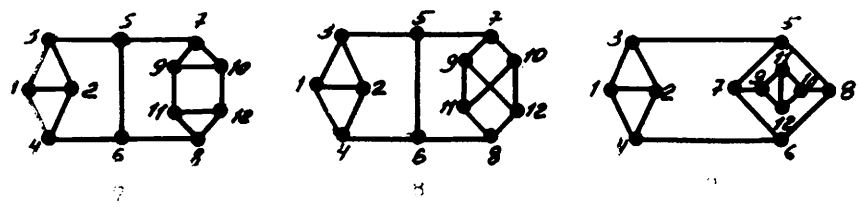
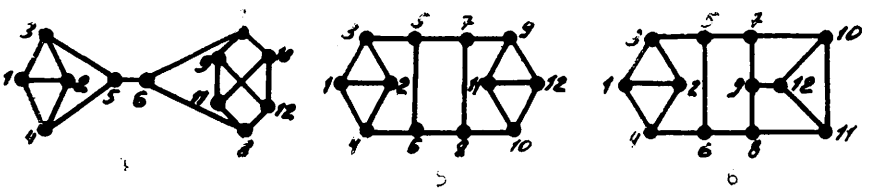
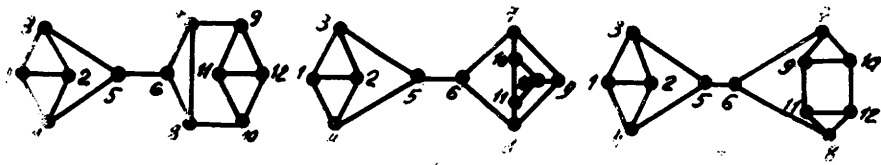
17. Лестница Мебиуса.

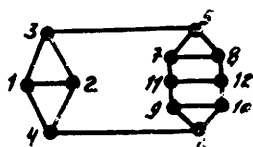


18

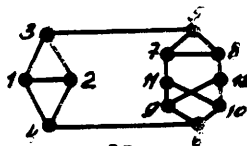


19. Граф Петерсена.

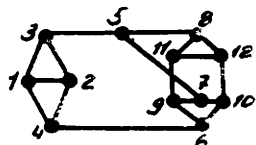




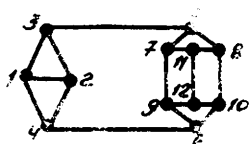
16



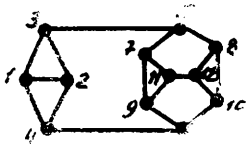
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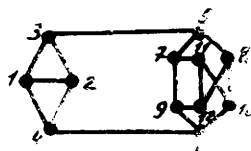
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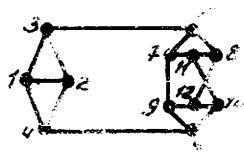
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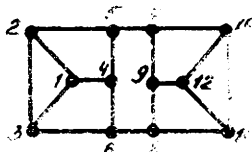
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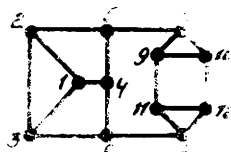
21



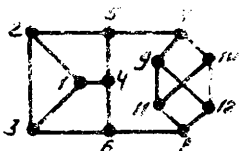
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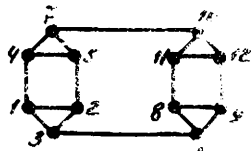
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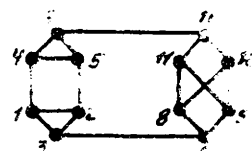
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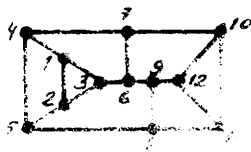
25



26



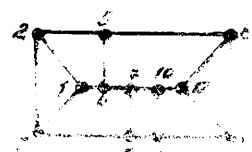
27



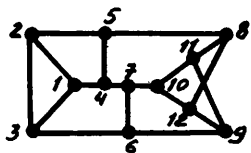
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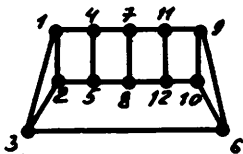
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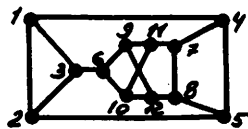
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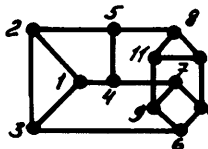
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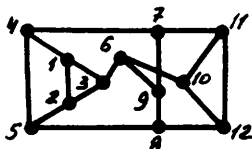
32



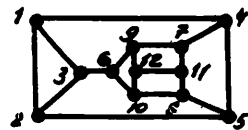
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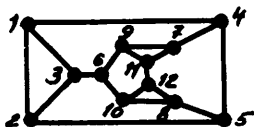
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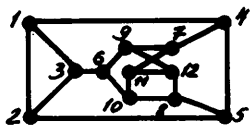
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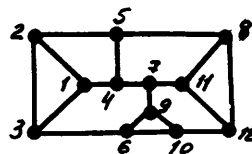
36



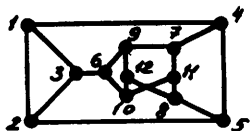
37



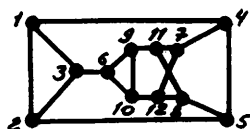
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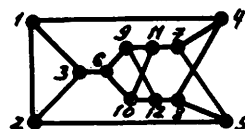
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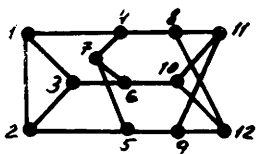
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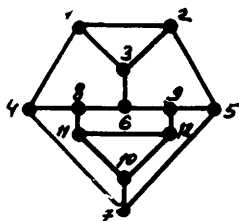
41



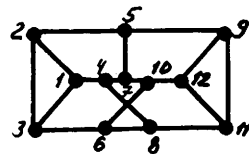
42



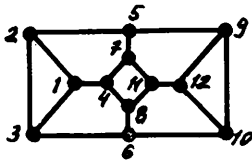
43



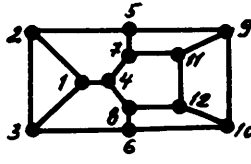
44



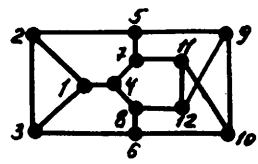
45



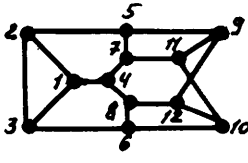
46



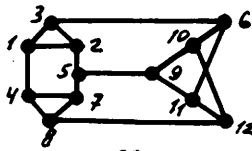
47



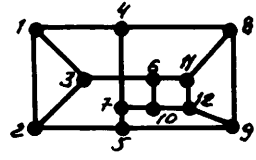
48



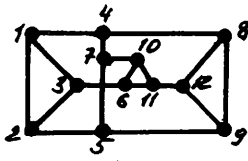
49



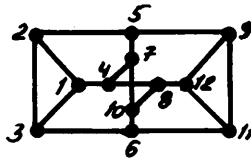
50



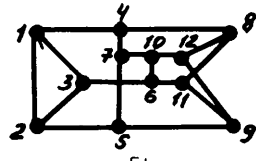
51



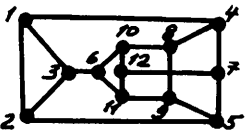
52



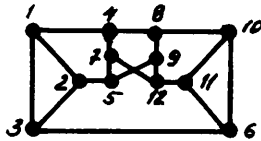
53



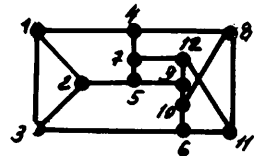
54



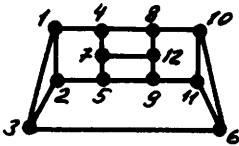
55



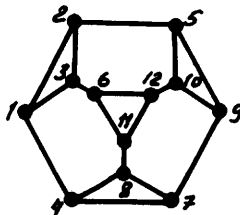
56



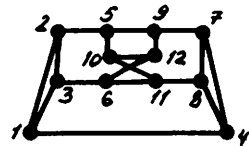
57



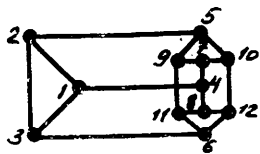
58



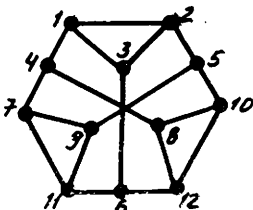
59



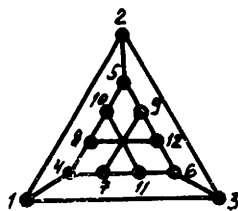
60



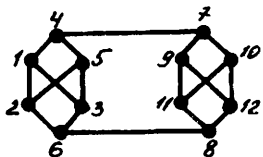
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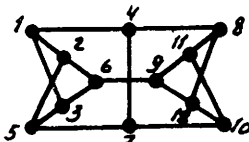
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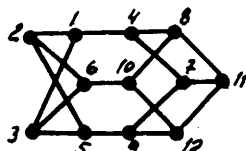
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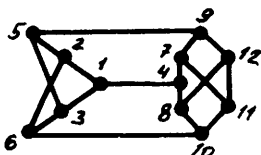
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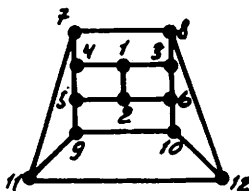
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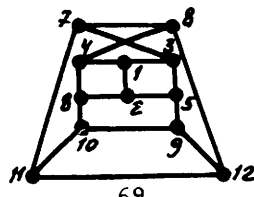
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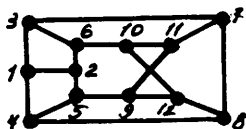
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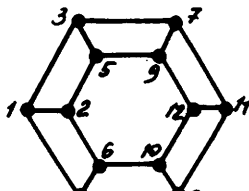
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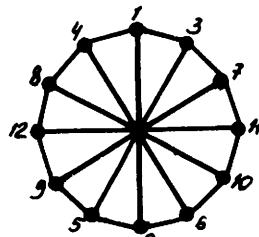
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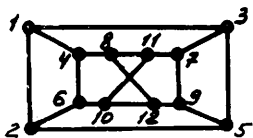
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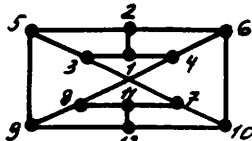
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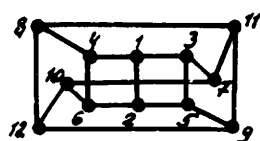
72. Лестница Мебиуса.



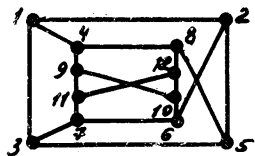
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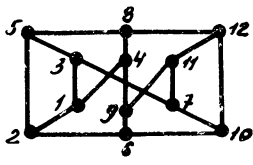
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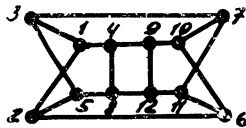
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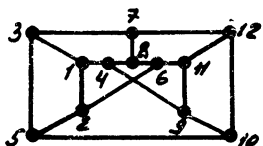
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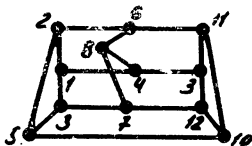
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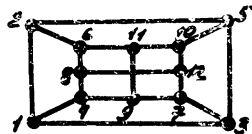
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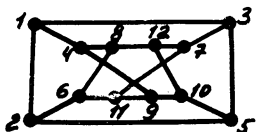
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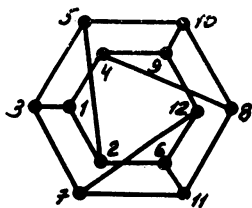
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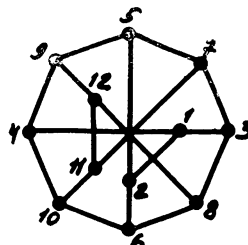
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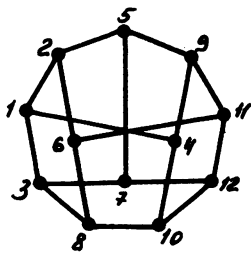
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83

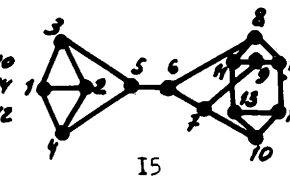
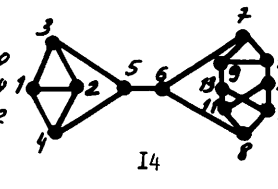
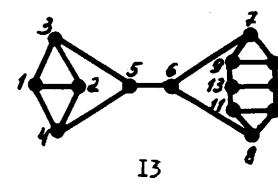
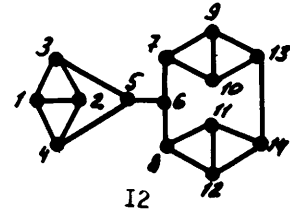
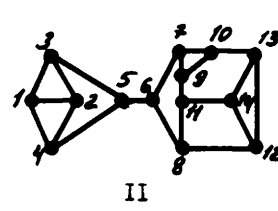
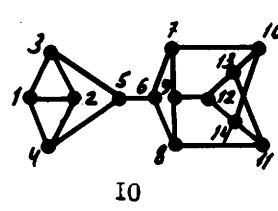
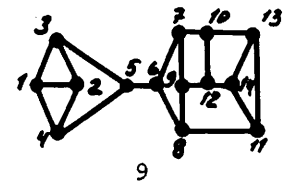
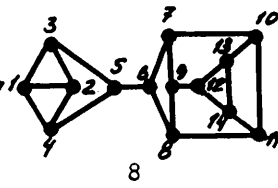
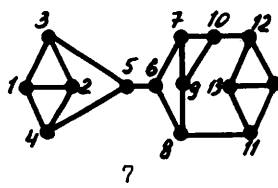
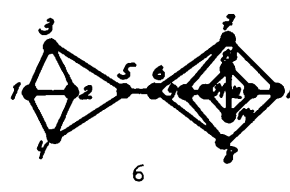
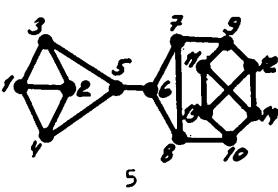
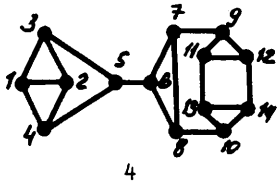
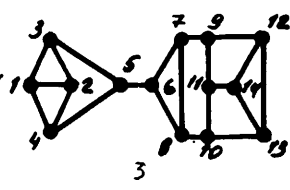
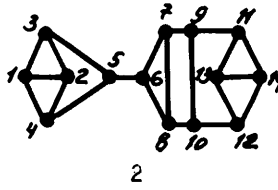
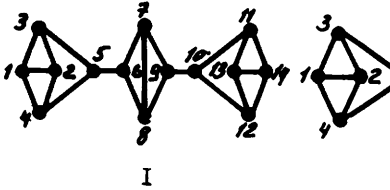


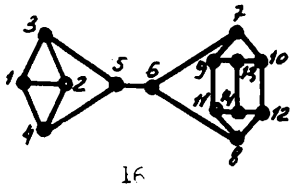
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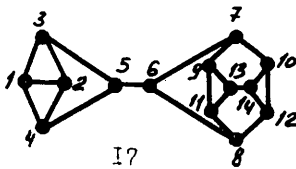
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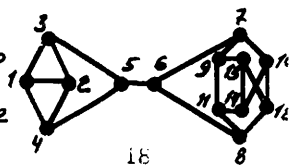




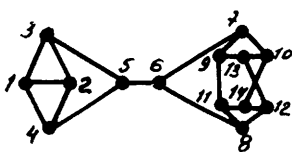
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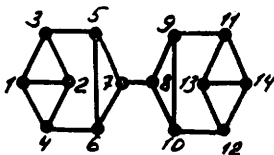
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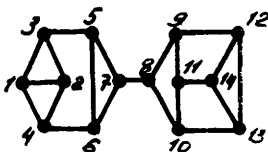
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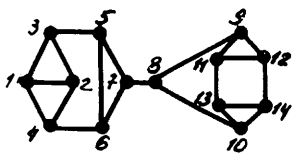
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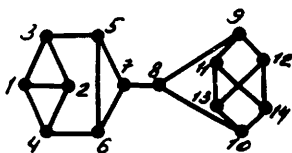
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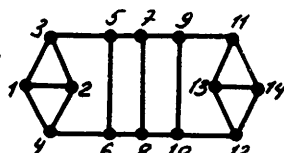
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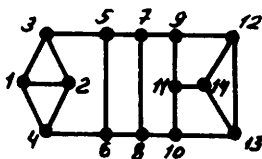
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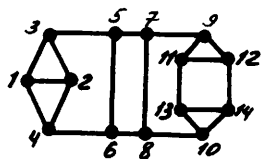
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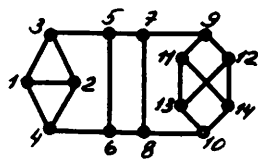
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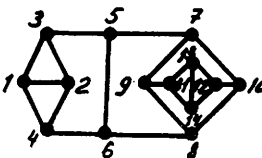
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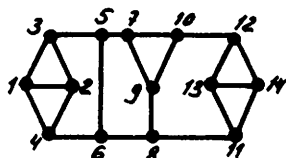
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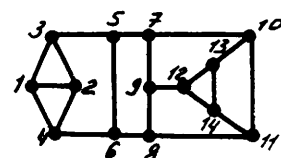
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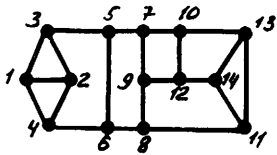
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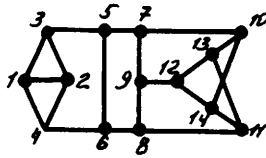
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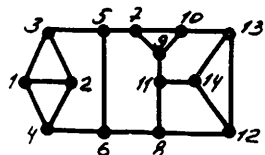
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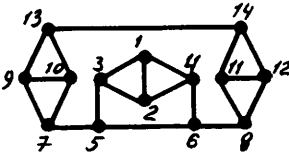
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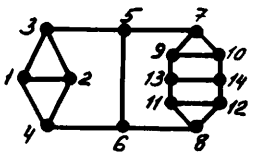
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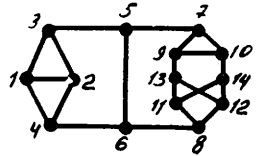
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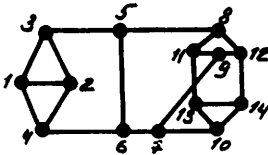
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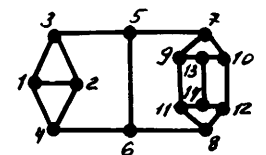
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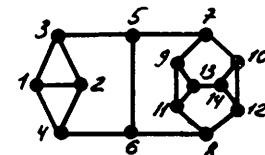
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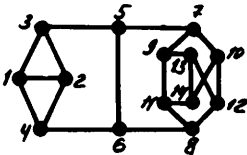
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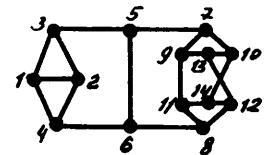
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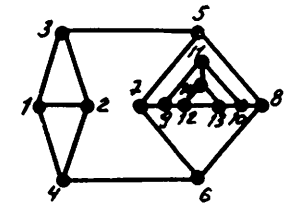
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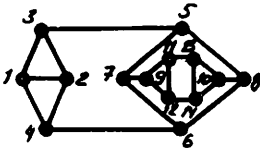
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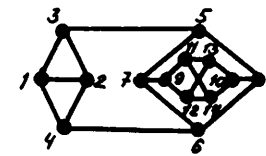
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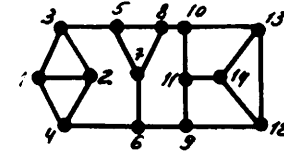
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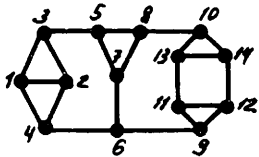
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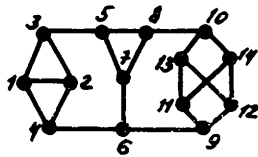
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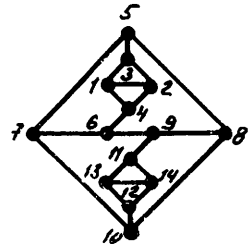
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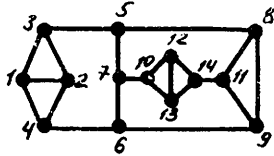
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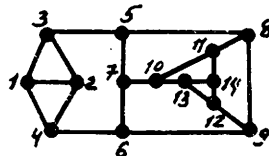
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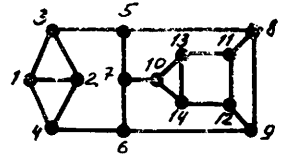
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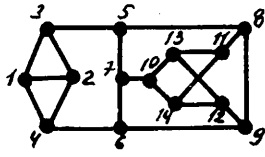
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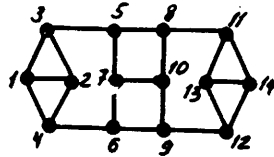
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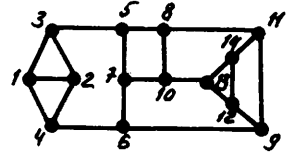
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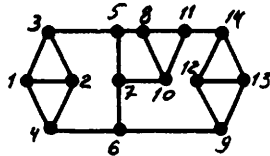
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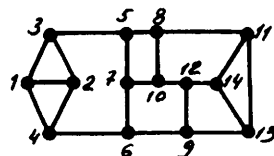
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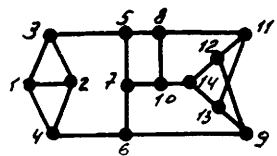
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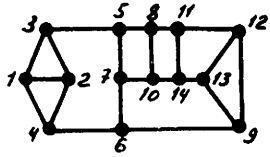
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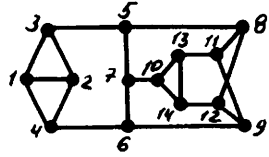
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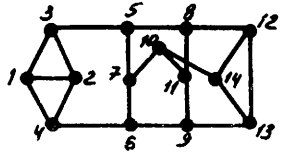
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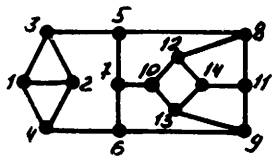
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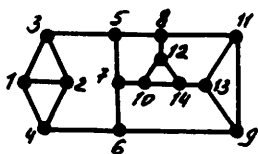
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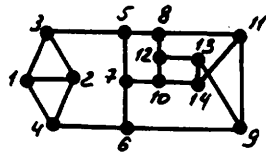
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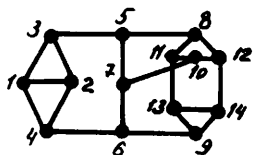
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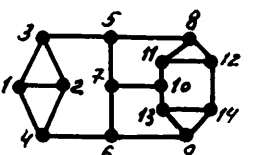
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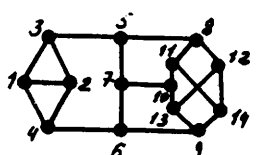
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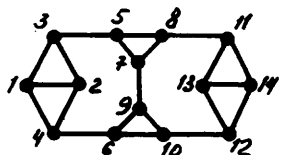
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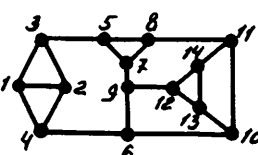
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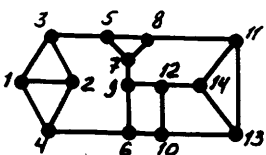
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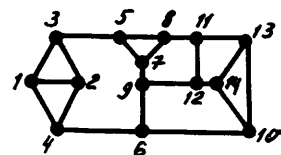
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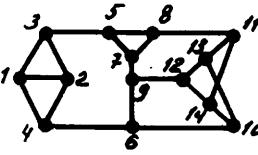
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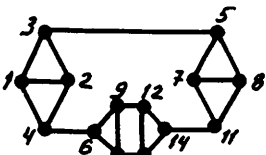
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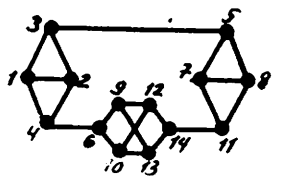
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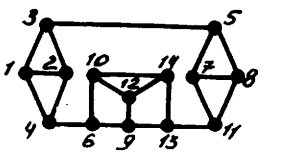
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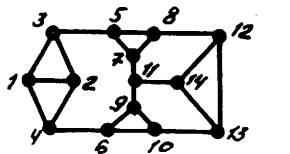
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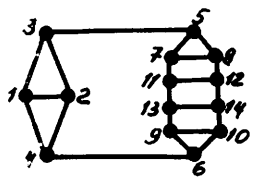
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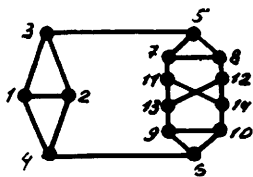
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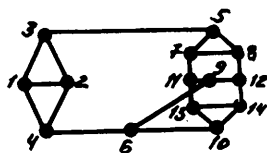
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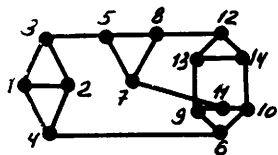
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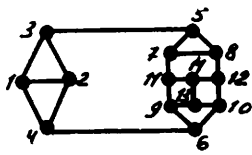
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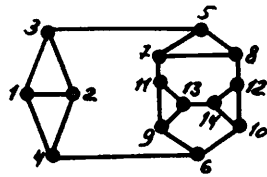
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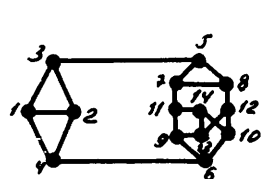
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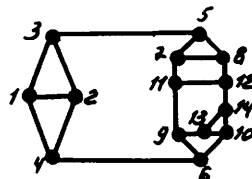
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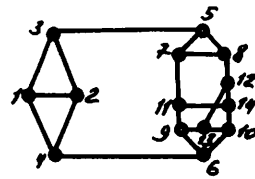
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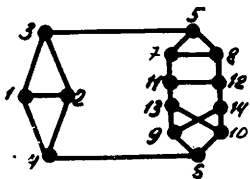
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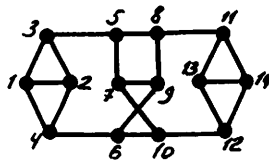
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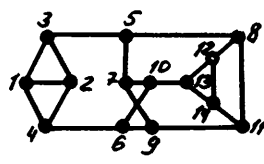
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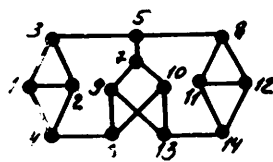
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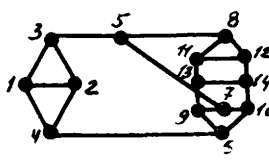
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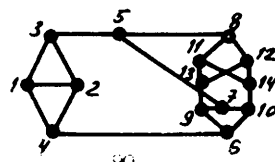
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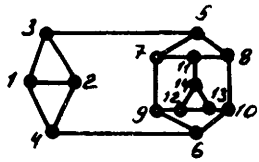
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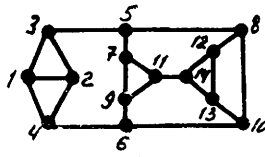
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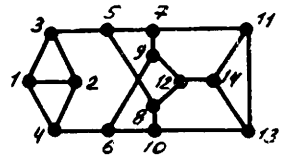
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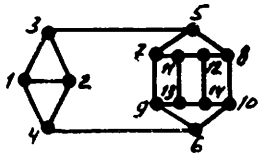
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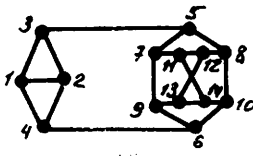
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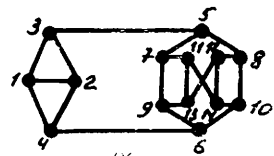
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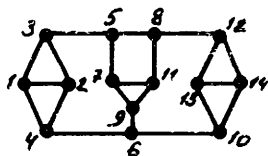
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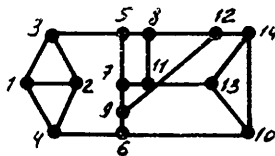
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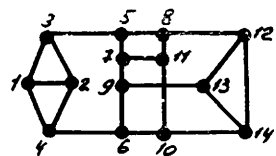
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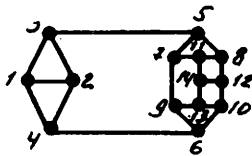
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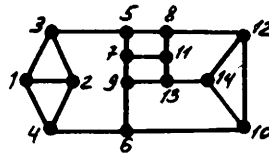
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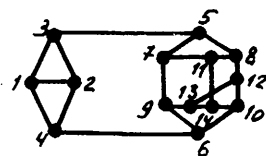
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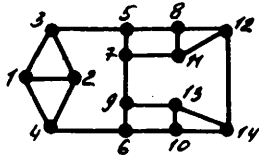
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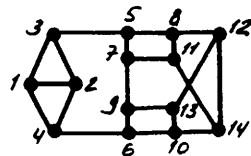
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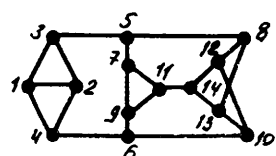
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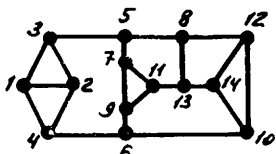
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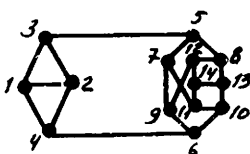
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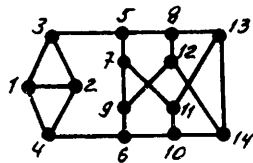
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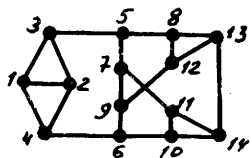
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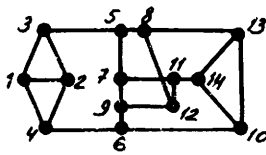
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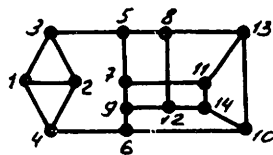
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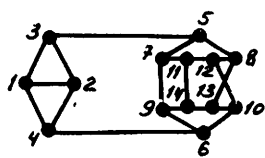
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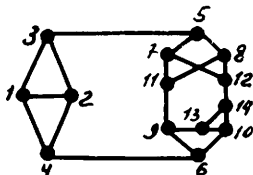
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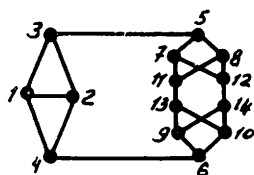
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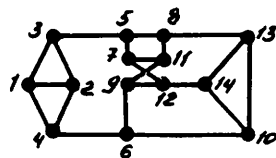
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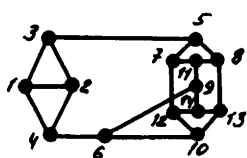
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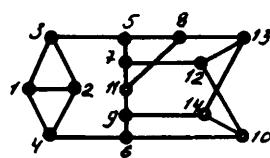
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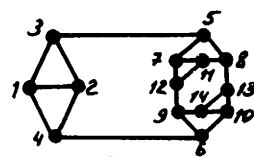
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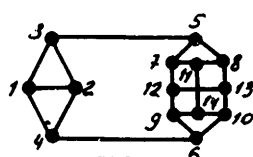
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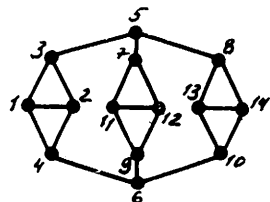
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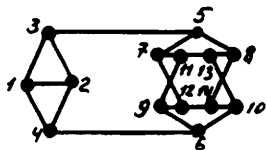
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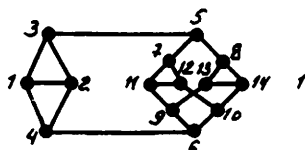
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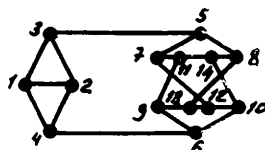
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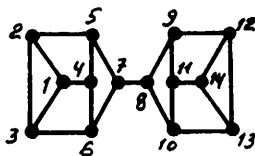
I21



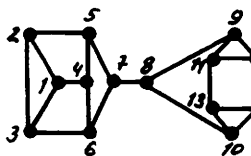
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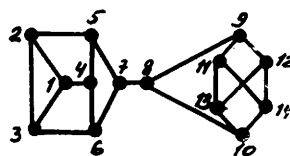
I23



I24



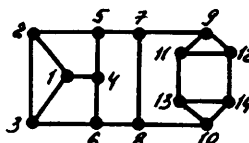
I25



I26



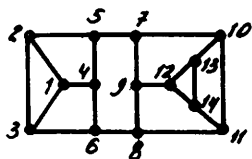
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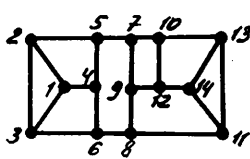
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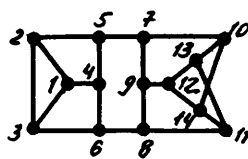
I29



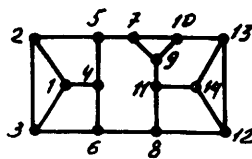
I30



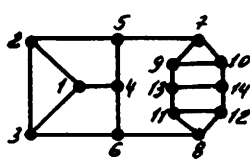
I31



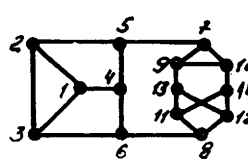
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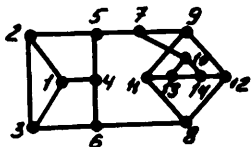
I33



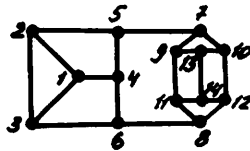
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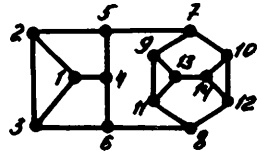
I35



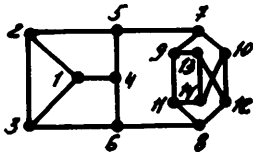
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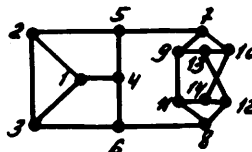
I37



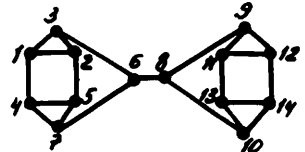
I38



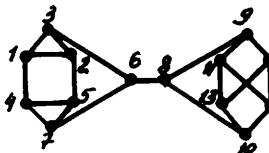
I39



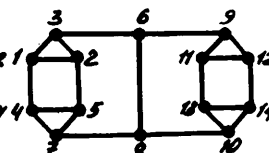
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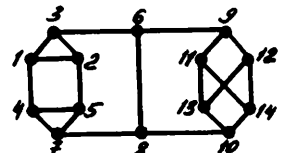
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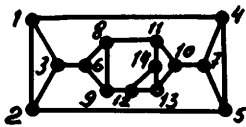
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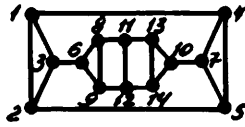
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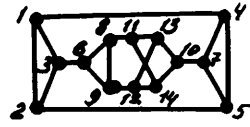
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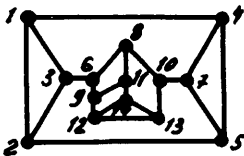
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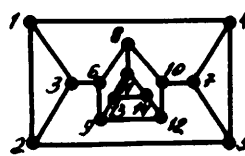
I46



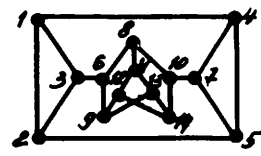
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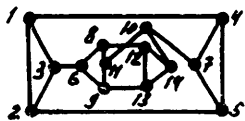
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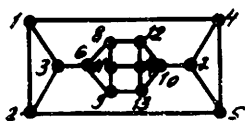
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I50



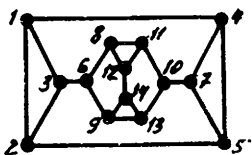
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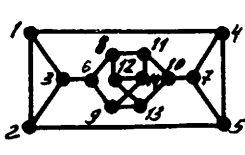
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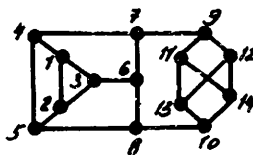
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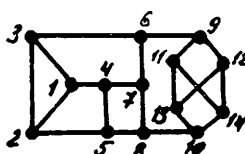
I54



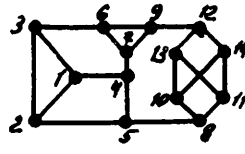
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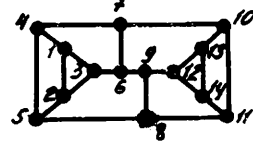
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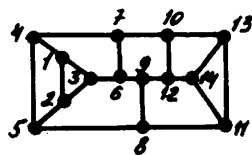
I57



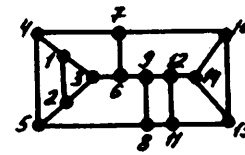
I58



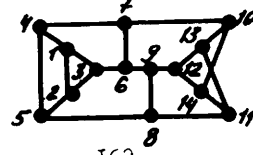
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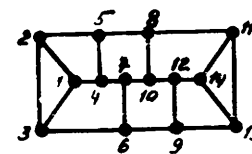
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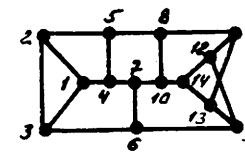
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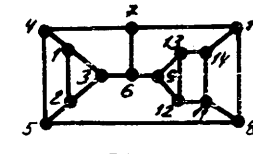
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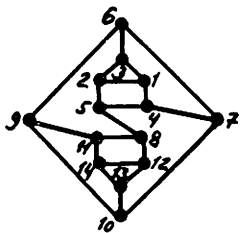
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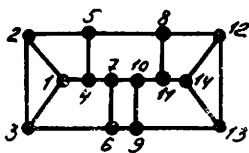
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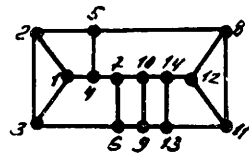
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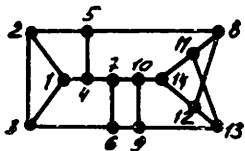
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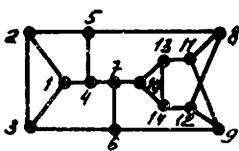
167



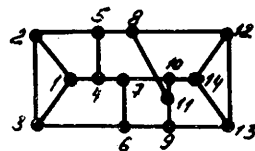
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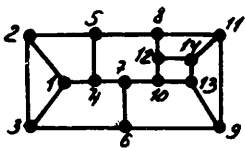
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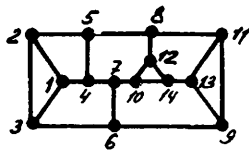
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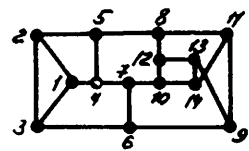
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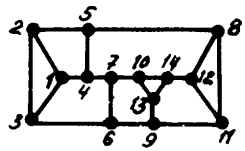
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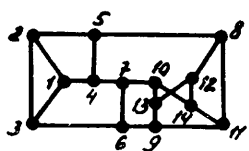
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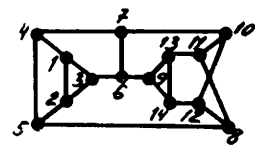
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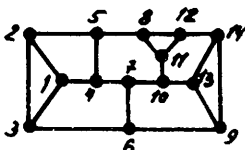
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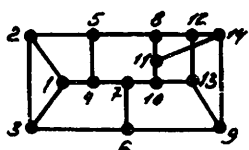
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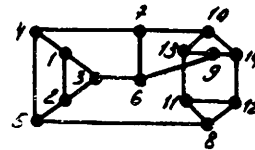
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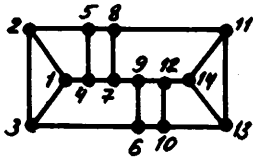
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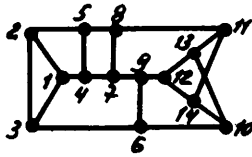
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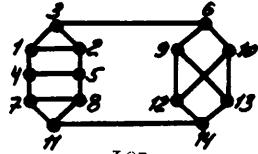
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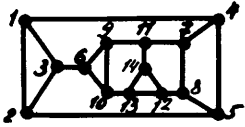
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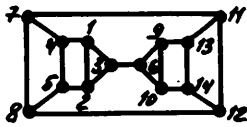
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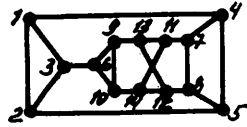
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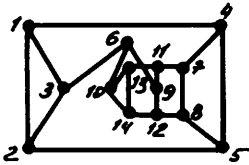
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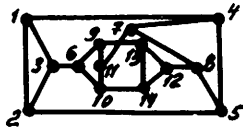
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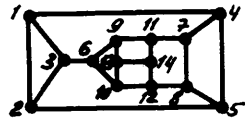
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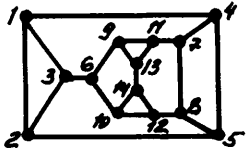
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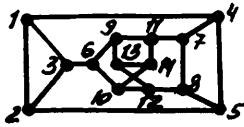
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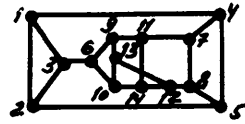
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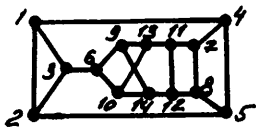
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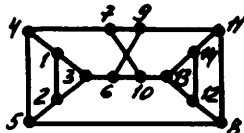
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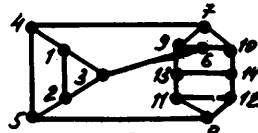
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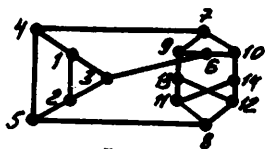
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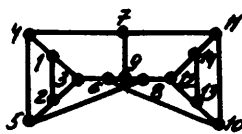
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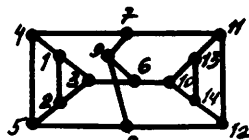
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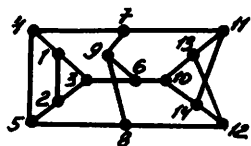
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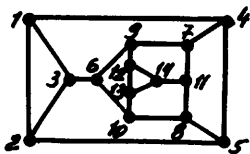
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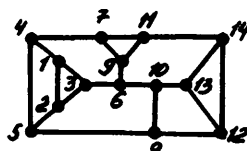
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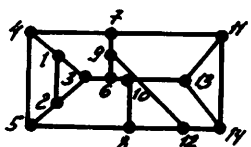
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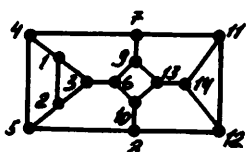
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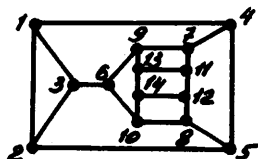
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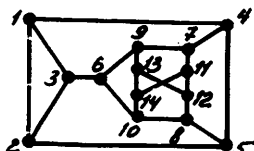
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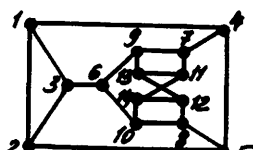
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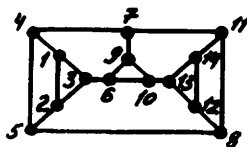
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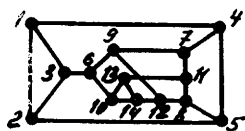
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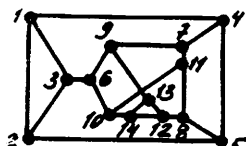
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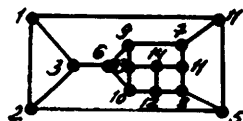
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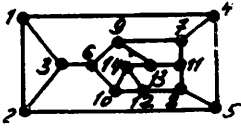
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209



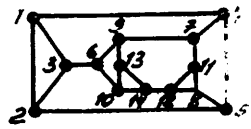
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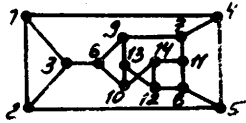
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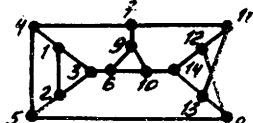
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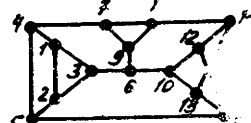
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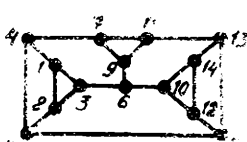
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2.5



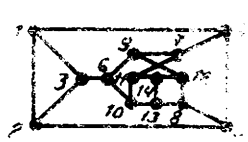
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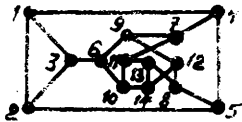
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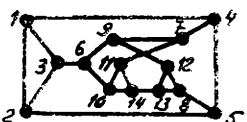
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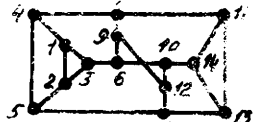
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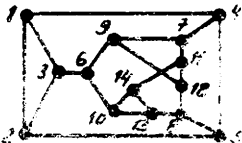
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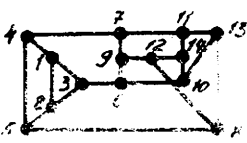
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2.12



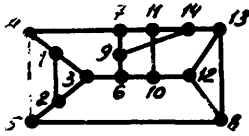
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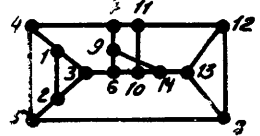
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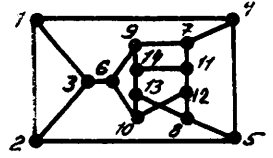
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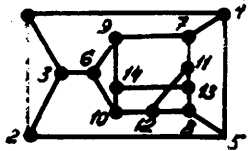
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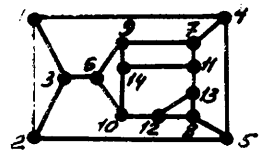
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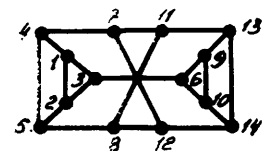
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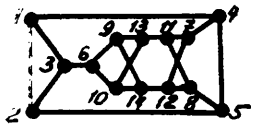
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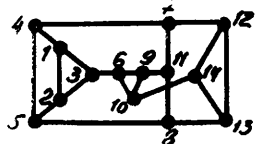
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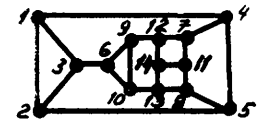
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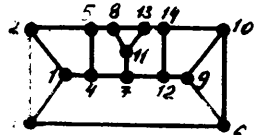
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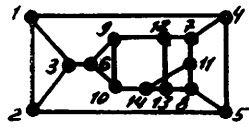
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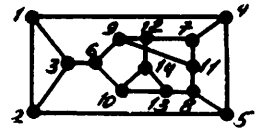
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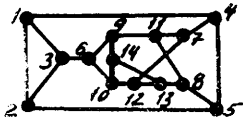
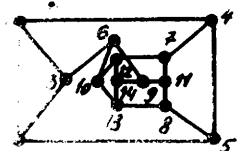
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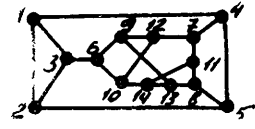
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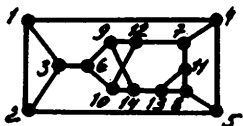


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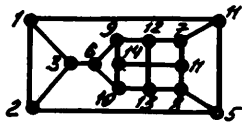


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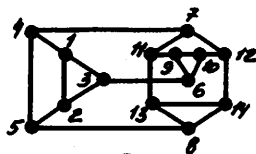




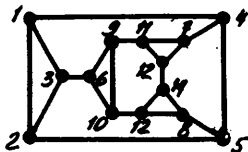
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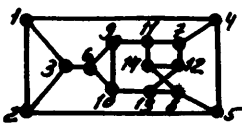
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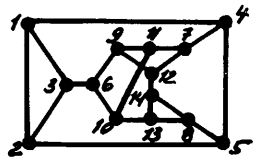
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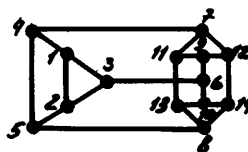
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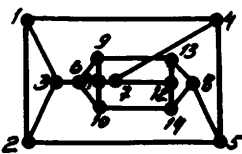
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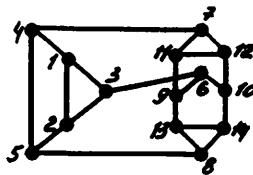
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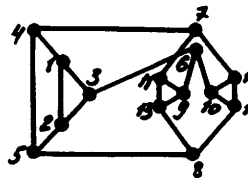
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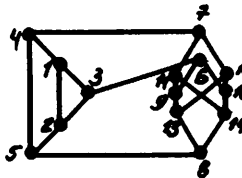
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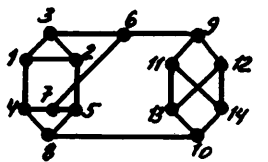
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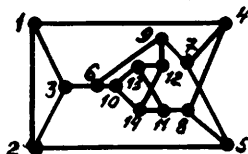
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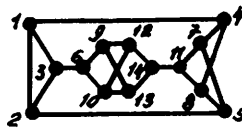
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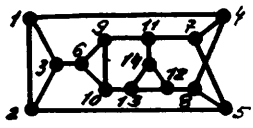
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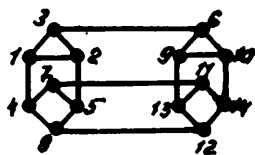
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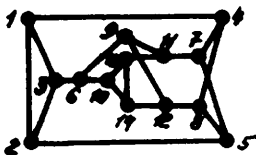
254



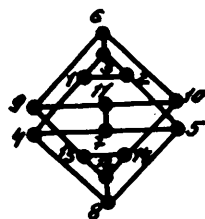
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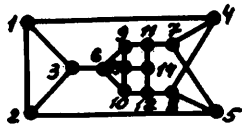
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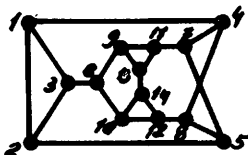
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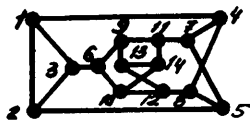
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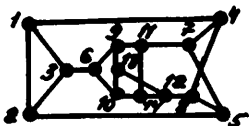
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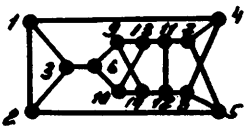
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261



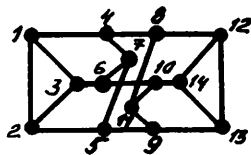
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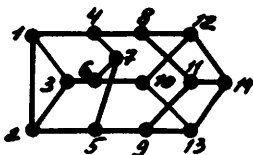
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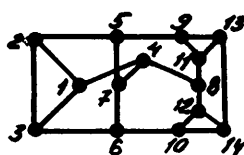
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265



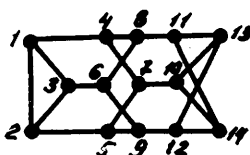
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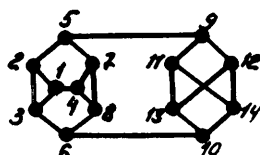
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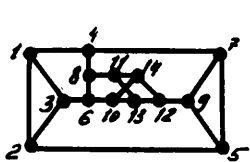
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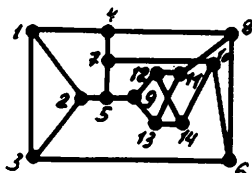
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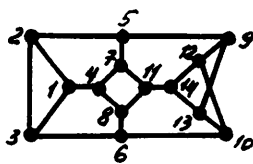
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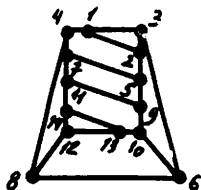
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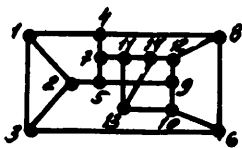
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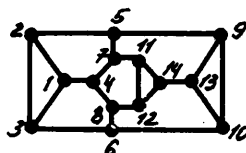
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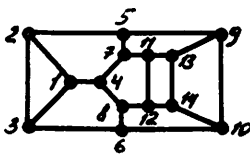
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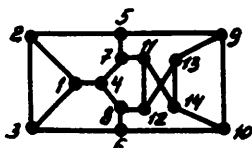
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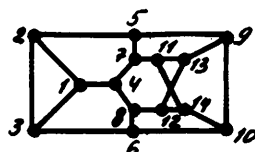
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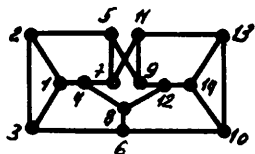
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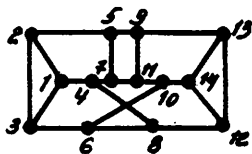
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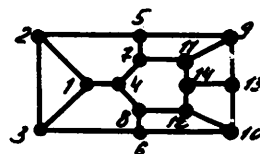
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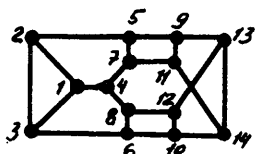
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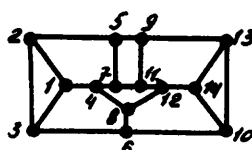
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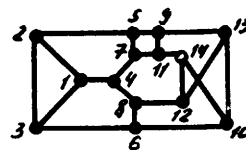
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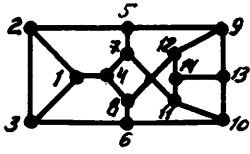
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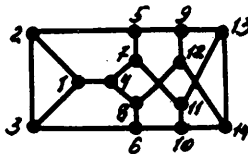
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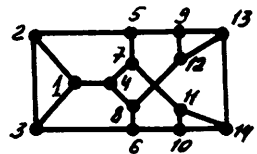
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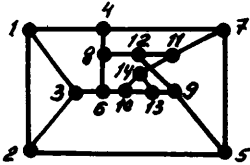
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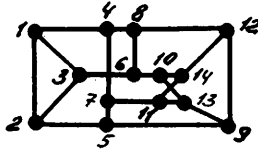
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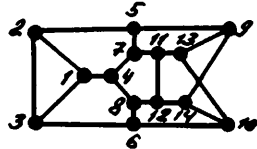
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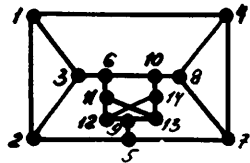
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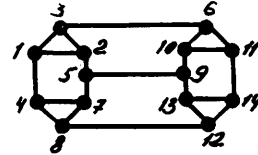
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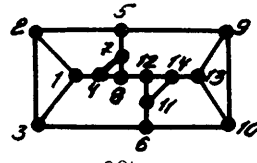
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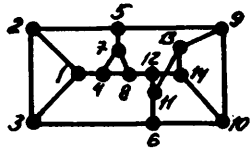
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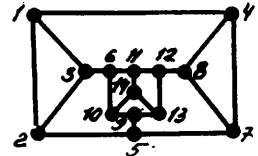
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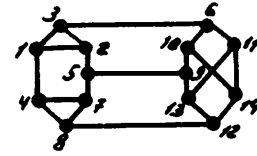
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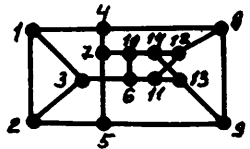
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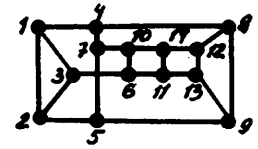
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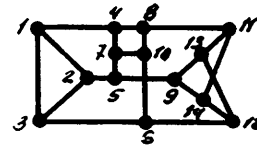
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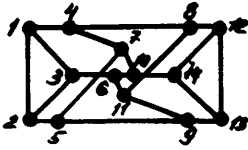
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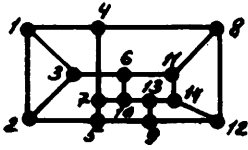
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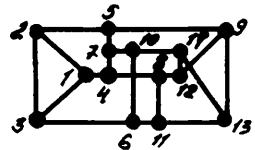
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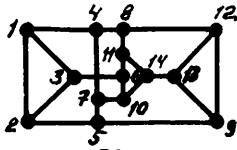
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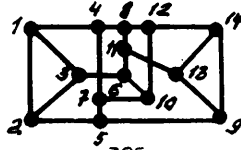
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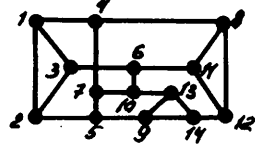
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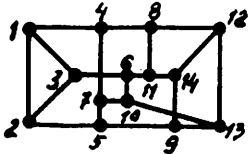
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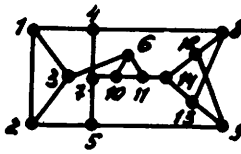
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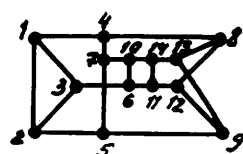
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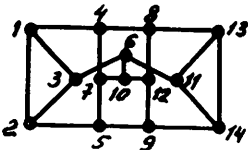
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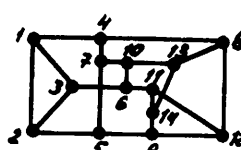
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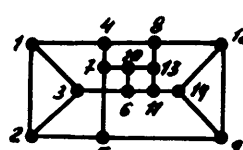
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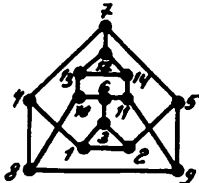
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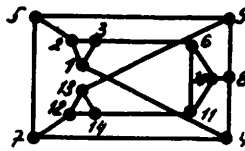
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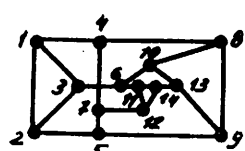
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315



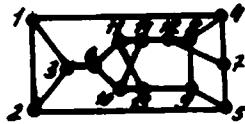
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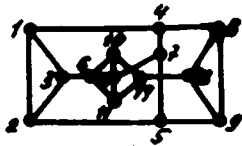
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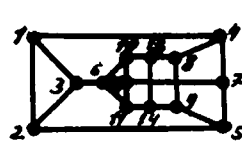
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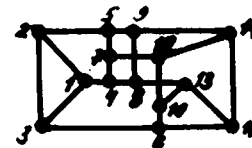
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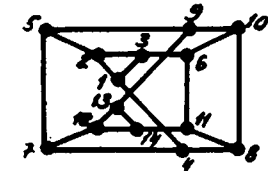
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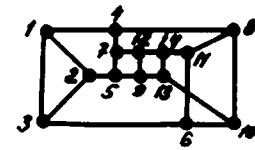
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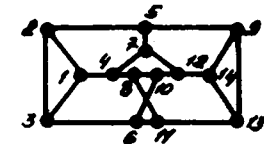
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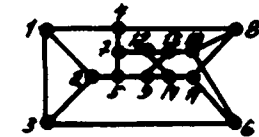
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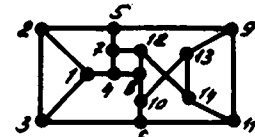
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327



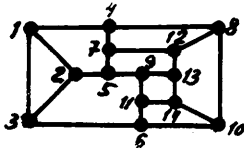
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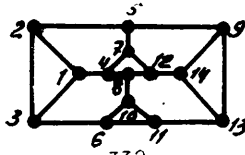
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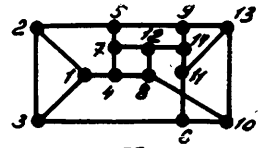
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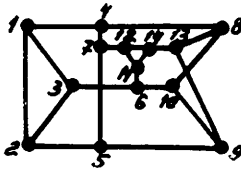
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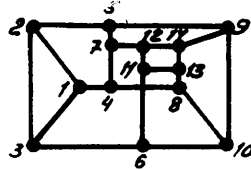
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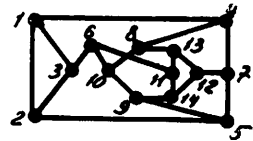
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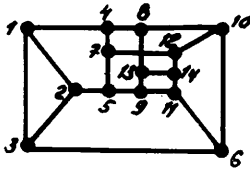
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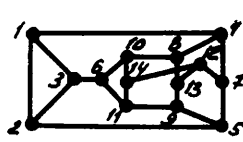
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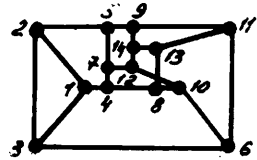
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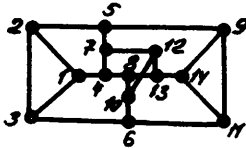
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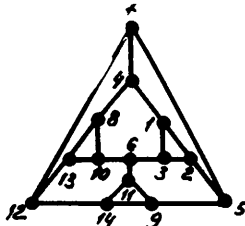
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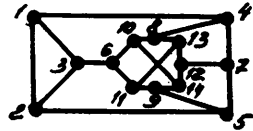
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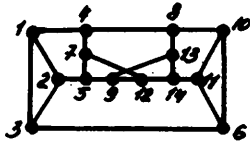
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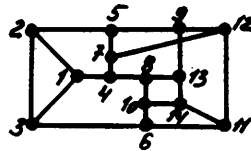
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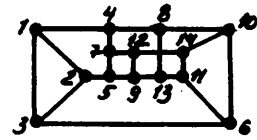
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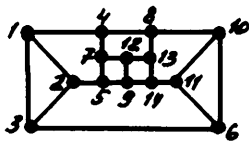
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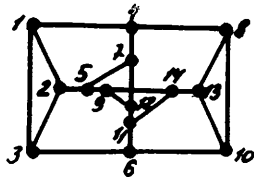
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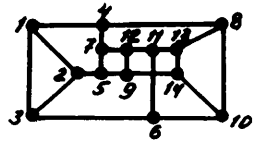
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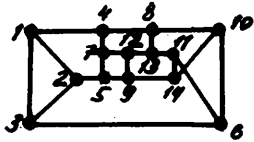
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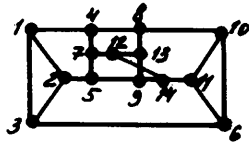
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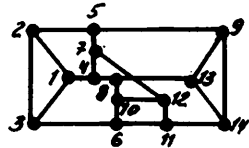
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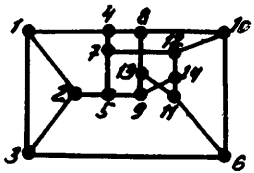
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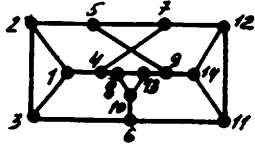
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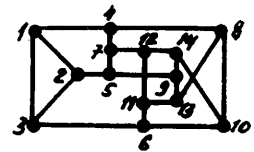
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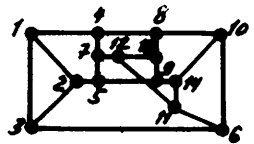
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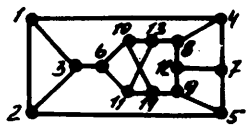
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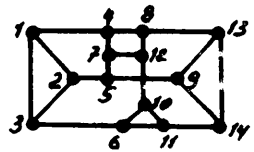
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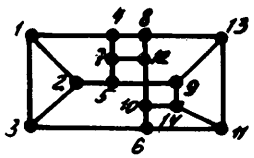
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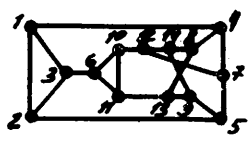
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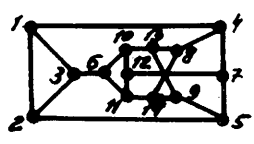
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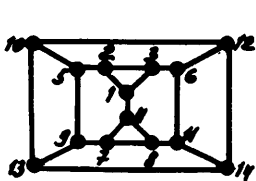
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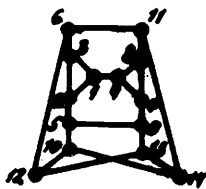
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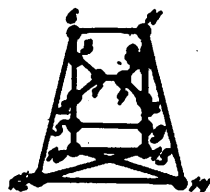
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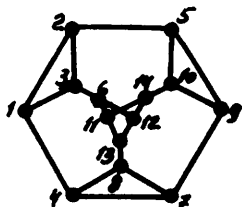
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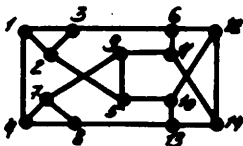
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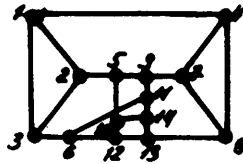
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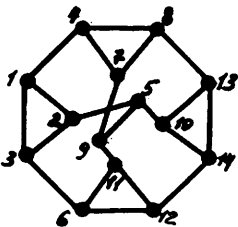
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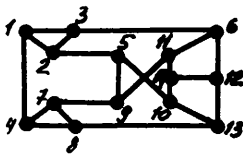
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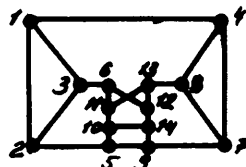
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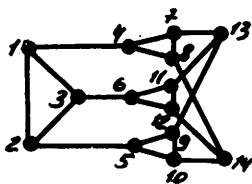
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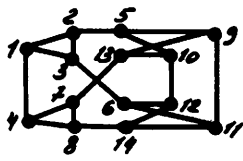
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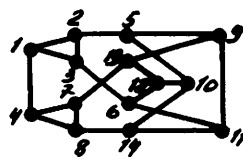
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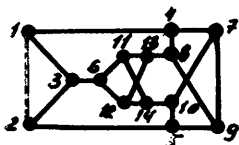
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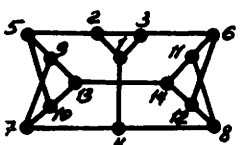
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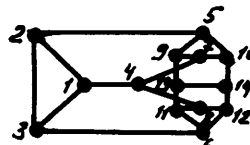
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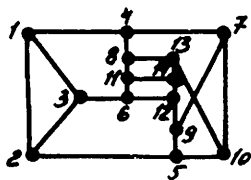
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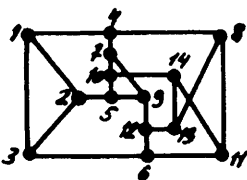
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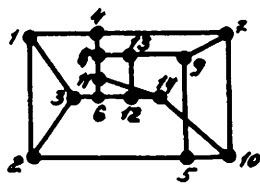
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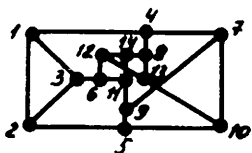
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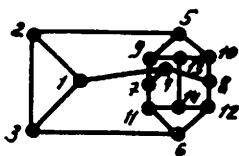
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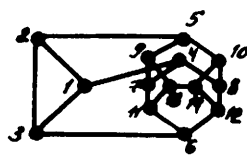
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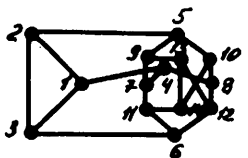
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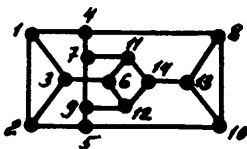
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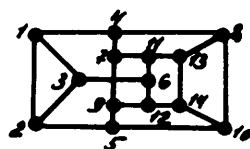
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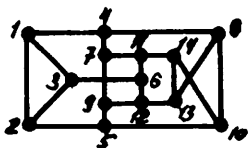
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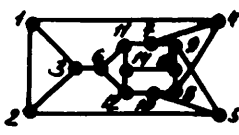
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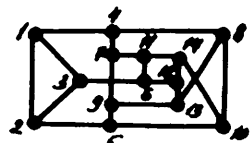
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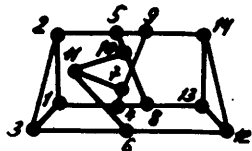
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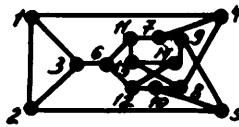
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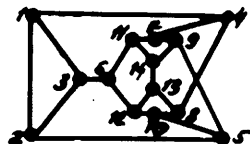
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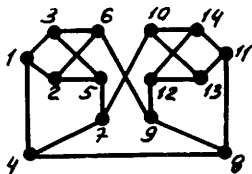
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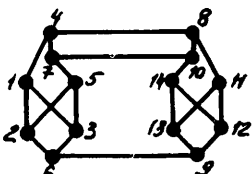
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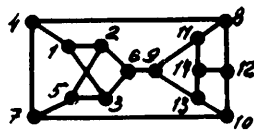
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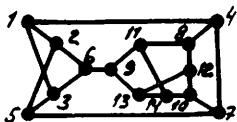
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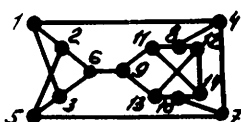
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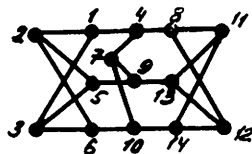
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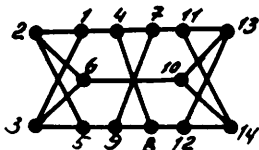
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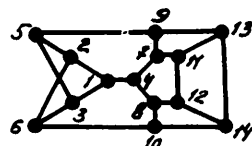
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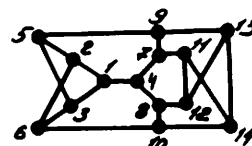
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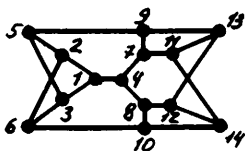
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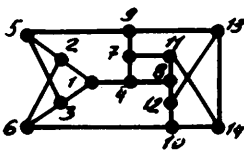
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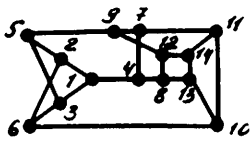
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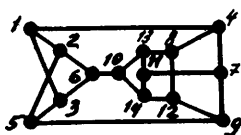
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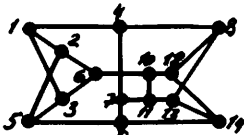
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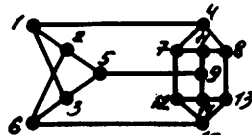
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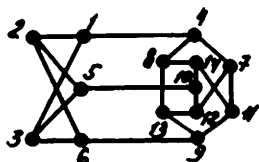
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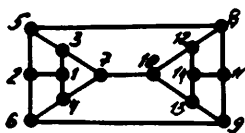
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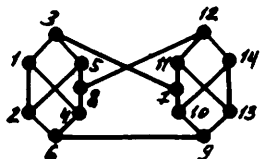
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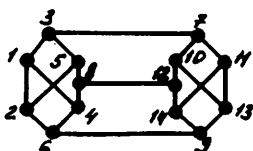
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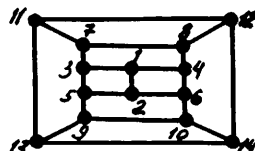
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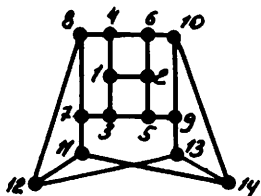
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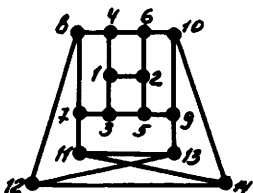
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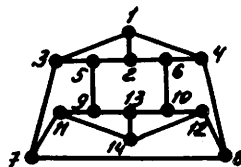
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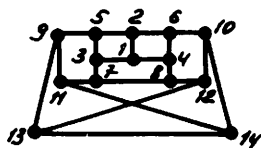
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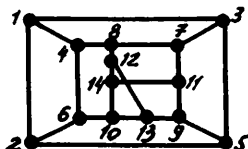
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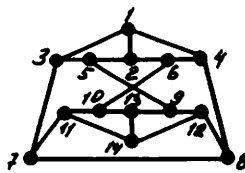
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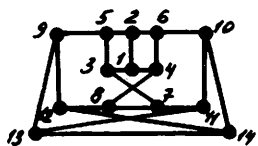
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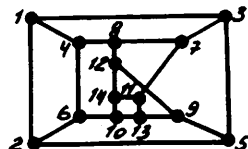
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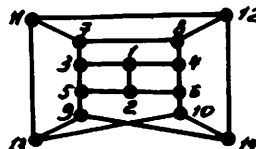
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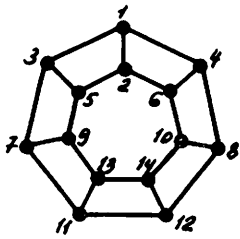
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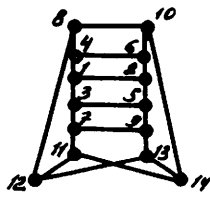
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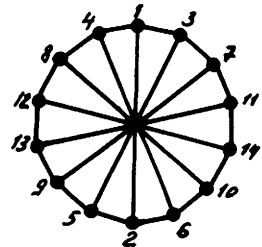
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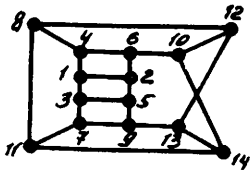
436. Призма



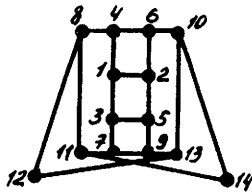
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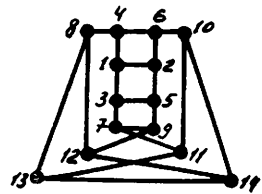
438. Лестница Мебиуса



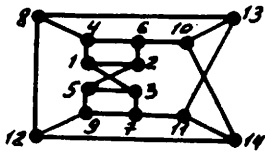
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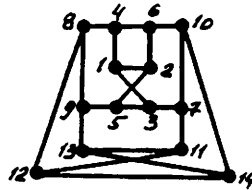
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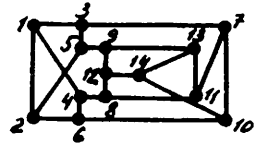
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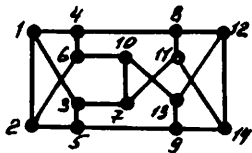
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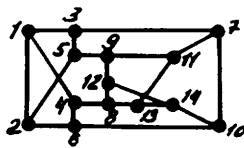
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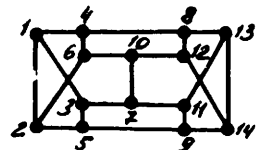
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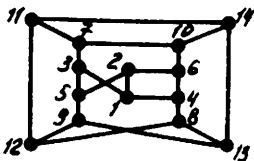
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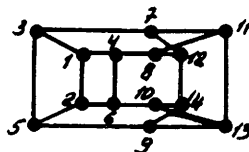
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447



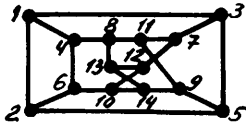
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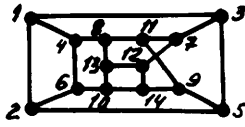
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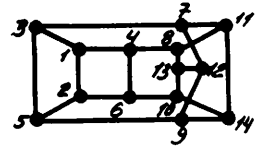
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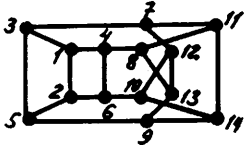
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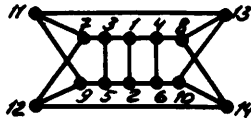
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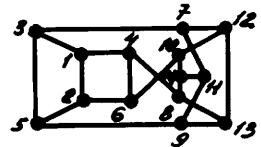
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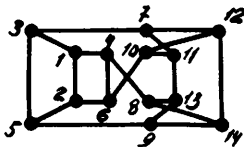
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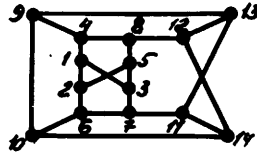
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456

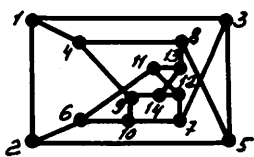


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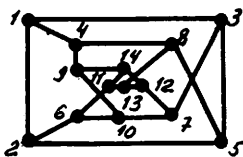


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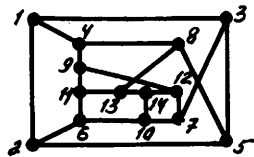




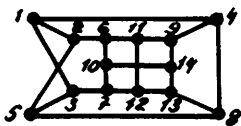
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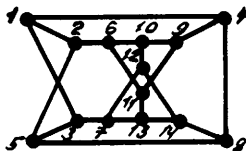
467



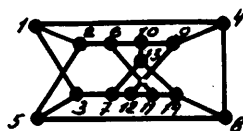
468



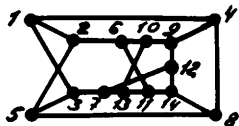
469



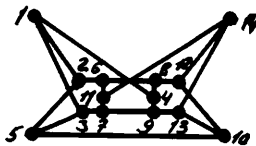
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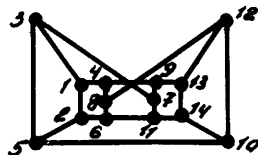
471



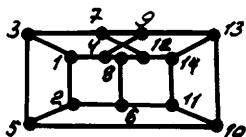
472



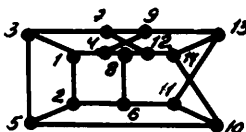
473



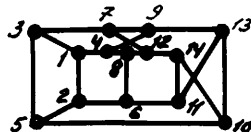
474



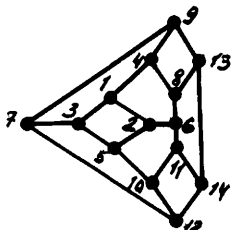
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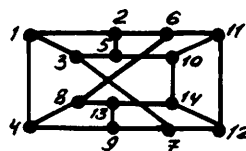
476



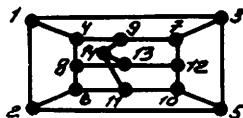
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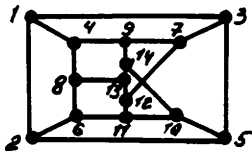
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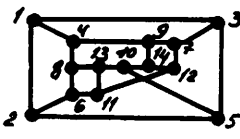
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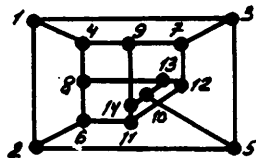
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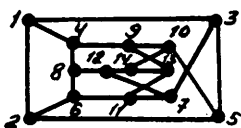
481



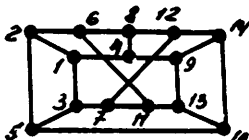
482



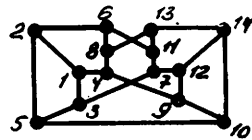
483



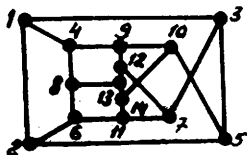
484



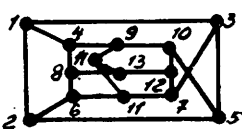
485



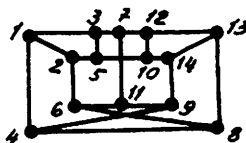
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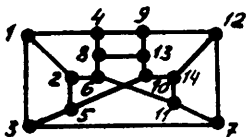
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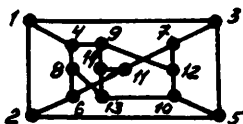
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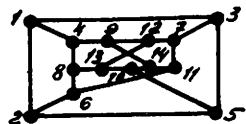
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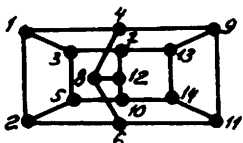
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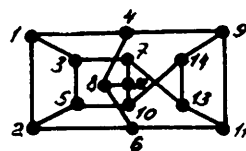
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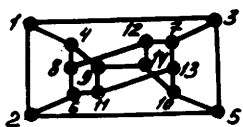
493



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