On multiplicities of eigenvalues of the Star graphs

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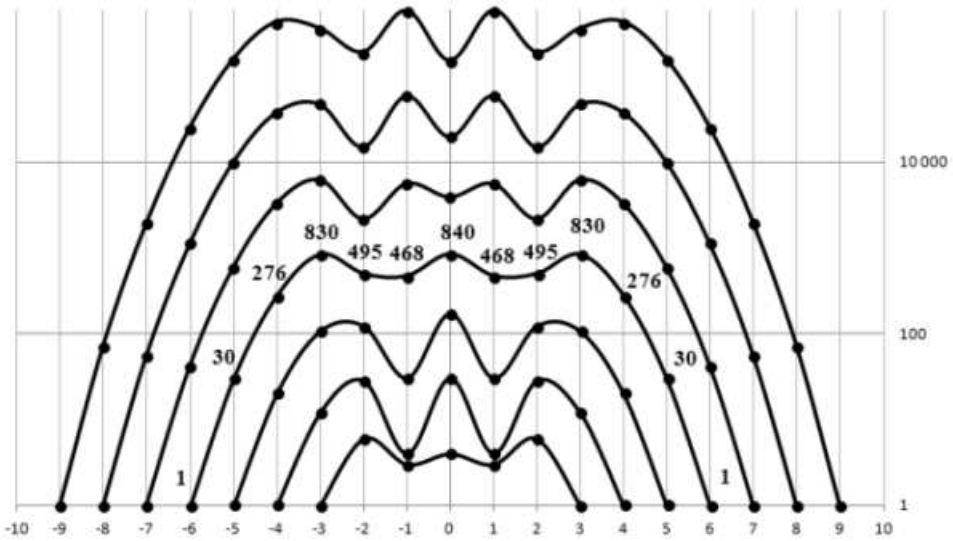
The objects of our research are spectra of Star graphs. The *Star graphs* $S_n = Cay(Sym_n, t)$ are the Cayley graphs on Sym_n with the generating set $t = \{(1,i), 2 \leq i \leq n\}$, where $(1,i)$ transposes the $1th$ and ith elements of a permutation $\pi = [\pi_1 \dots \pi_i \dots \pi_n]$.

In [3] it was shown that the spectrum of S_n contains all integers from $-(n-1)$ to $n-1$ (with the sole exception that when $n \leq 3$, zero is not an eigenvalue of S_n). At the same time, Chapuy G. and Feray V. [2] proposed to use a combinatorial approach to calculate multiplicities of eigenvalues of the Star graphs. In this talk we present multiplicities of eigenvalues of S_n for $4 \leq n \leq 10$, which were calculated by using a combinatorial approach. Results obtained presented on the figure below, where the abscissa and the ordinate correspond to the units eigenvalues of the Star graphs and their multiplicities, correspondingly. For example, the multiplicities (1, 30, 276, 830, 495, 468, 840, 468, 495, 830, 276, 30, 1) of the corresponding eigenvalues (-6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6) for the Star graph S_7 are presented on the figure. The same results for $4 \leq n \leq 6$ were also obtained in [1] by GAP.



References

[1] Abdollahi A., Vatandoost E. Which Cayley graphs are integral? *The electronic journal of combinatorics* **16** (2009) 6-7.

[2] Chapuy G., Feray V. A note on a Cayley graph of Sym_n. *arXiv:1202.4976v2* (2012) 1-3.

[3] Krakovski R., Mohar B. Spectrum of Cayley Graphs on the Symmetric Group generated by transposition. *Linear Algebra and its applications* **437**(2012) 1033–1039.