Questions

Question 1. *Prove that* $J_4 \times J_4$ *is recognizeble by set of conjugacy class sizes.*

Question 2. *If complement of prime graph of finite group contain no triangles then it is 3-colorable.*

Question 3. *Is it true that* $E_8(q) \times E_8(q)$ *is recognisible by spectrum.*

Question 4. *Define* $\Theta_\pi = \{\tau \subseteq \pi \mid \tau \neq \varnothing, |\tau| \geq |\pi| - 1\}$. *Let* π *be a set of primes. We say that a group* G *satisfies the condition* π^* *if for every* $a \in N(G)$ *there exists* $\tau_a \in \Theta_\pi$ *such that* $a_\pi = |G||_{\tau_a}$. *Determine maximal size of* π *such that there exists a group* $G \in \pi^*$

Question 5. *Is it complement of prime graph of finite group contains* 5*-engeles.*

Question 6. S_3 *conjecture.*

Question 7. *Let there exists* p*-element* $g \in G$ *such that* $|g^G|_p = |G||_p$. *Is it true that* G *contains the normal* p*-compliment?*

Question 8 (Alexandre Moreto 2018 Monatsh Math)**.** *1) Let* S *be a finite simple group and* p *the largest divisor of* $|S|$. *If* G *is a finite group with the same number of elements of order* p *as* S *and* $|G| = |S|$, *then* $S \simeq G$.

2) Let S *be nonabelian simple group that is not isomorphic to* $L_2(q)$, *where* q *is Mersenne prime and let* p *be the largest prime divisor of* $|S|$. *If a finite group* G *is generated by elements of order* p *and* G *has the same number of elements of order* p *as* S*? then* $G/Z(G) \simeq S$.

Question 9 (Alexandre Moreto, Robert Guralnick 2018 Mathematische Nachrichten)**.** *Let* G *be a finite group and assume that* $(xy)^G = x^G y^G$ *for every* $x, y \in G$ *of prime power order with* $(|x|, |y|) = 1$. *Then* G *is solvable. Classify all such groups.*

Question 10. *Let* L *be a non-abelian simple group,* $H(L) = M(L).L$, *where* $M(L)$ *is a Schur multiplier of* L. *Put* G *the group with property* $N(G) = N(H(L))$. *When we can garanted that* $G \simeq H(L) \times A$, *where* A *is an abelian group?*

Question 11. *Let* S *be a non-abelian simple group. Is it true that for any* $n \in \mathbb{N}$ *the group* S^n *is recognizable?*

Question 12. *12.33. Suppose that* G *is a finite group and* x *is an element of* G *such that the subgroup* $\langle x, y \rangle$ *has odd order for any* y *conjugate to* x *in* G. *Prove, without using CFSG, that the normal closure of* x *in* G *is a group of odd order.*

Question 13. *Let* Ω_1 *and* Ω_2 *be sets of integers and if* $a \in \Omega_1$, $b \in \Omega_2$ *then* $(a, b) = 1$. *Put* G *is a finite group and* $N(G) = \Omega_1 \times \Omega_2$. *When* $G = A \times B$, *where* $N(A) < \Omega_1$ *and* $N(B) < \Omega_2$. *We can to formulate a more general question*