Matematiska Institutionen
KTH

Homework number 4 to SF2736, fall 2014.

Please, deliver this homework at latest on Monday, December 8, 2014. Provide both your name and your e-mail address with your solutions.

The homework must be delivered individually, and, in general, just hand-written notes are accepted. You are allowed to discuss the problems with your classmates, but you are not allowed to deliver a copy of the solution of another student.

1. (0.2p) Consider the symmetrical group $\mathcal{S}_{10}$ of permutations of the elements in the set $\{1, 2, \ldots, 10\}$. For which integers k are there elements φ in $\mathcal{S}_{10}$ of order k.

2. (0.2p) Let φ and ψ denote the following elements in the symmetrical group $\mathcal{S}_6$:

$$\varphi = (1 \ 2 \ 4)(3 \ 5)(2 \ 6), \qquad \psi = (1 \ 5 \ 3 \ 4)(3 \ 5 \ 2)$$

Is there any element γ in $\mathcal{S}_6$ such that

$$\varphi\gamma\varphi\gamma\varphi = \psi.$$

3. (0.3p) Find two non-Abelian groups of size 12 that are not isomorphic.

4. (0.3p) The set $U(\mathbb{Z}_{24})$ of multiplicatively invertible elements in $\mathbb{Z}_{24}$ constitutes an Abelian group. This group is isomorphic to a direct product S of cyclic groups. Find this direct product S.