Matematiska Institutionen
KTH

Homework number 4 to SF2736, fall 2012.

Please, deliver this homework at latest on Tuesday, November 27.
    The homework must be delivered individually, and, in general, just hand-written notes are accepted. You are free to discuss the problems below with your class mates, but you are not allowed to copy the solution of another student.

1. (0.2p) The group $G = (Z_{17} \setminus \{0\}, \cdot)$ is cyclic. Find all generators of G.

2. (0.2p) The set of invertible (by multiplication) elements in Z_{25} consti-tutes an Abelian group denoted $U(Z_{25})$. This group is isomorphic to a direct product of some cyclic groups. Find these cyclic groups.

3. Let $\mathcal{S}_n$ denote the group consisting of all permutations on the set $\{1, 2, 3, \ldots, n\}$.

   (a) (0.1p) Find the smallest subgroup $\mathcal{T}_3$ to $\mathcal{S}_4$ that contains the per-mutations $\tau_2 = (1\ 2)$ and $\tau_3 = (1\ 3)$.

   (b) (0.2p) Find all subgroups H to $\mathcal{S}_4$ such that $\mathcal{T}_3 \subseteq H \subseteq \mathcal{S}_4$.

   (c) (0.3p) Generalize your answer above.