Exam 2   **Abstract Algebra 1**   **23–12–2015**

Incomplete solution will not receive full mark.

1. Draw the subgroup lattice for the cyclic group $\mathbb{Z}_{20}$.

2. Draw the Cayley table for the factor group G/N, where $G = U_8 \times U_{10}$ and $N = \langle (3,7) \rangle$.

3. Prove that the subgroup $SL(n, \mathbb{Q})$ is normal in $GL(n, \mathbb{Q})$.

4. Let G be an infinite cyclic group. Prove that G is isomorphic to $\mathbb{Z}$.

5. Let $E = \{ z \in \mathbb{R}^* \mid z > 0 \}$, a subgroup of $\mathbb{R}^*$. Prove that $\mathbb{R} \approx E$ using the function $\theta(x) = 2^x$.

–Amin Witno