1. Assume that $H \triangleleft K \triangleleft G$ and $H \triangleleft G$.
   (a) (2 points) Prove that $K/H$ is a subgroup of $G/H$.
   (b) (2 points) Prove $K/H \triangleleft G/H$.

2. (2 points) Let $G$ and $H$ be finite groups. Let $\varphi : G \to H$ be a surjective homomorphism. Prove that $|H|$ divides $|G|$.

3. (2 points) Let $\varphi : G \to K$ be a surjective homomorphism. Let $J \triangleleft K$. Prove that there exists a normal subgroup $H$ of $G$ such that $G/H$ is isomorphic to $K/J$.

4. Find, up to isomorphism, all abelian groups of order
   (a) (1 point) 324,
   (b) (1 point) 900.