**UH - Math 3330-01 - Dr. Heier - Spring 2017**
**HW 10**
**Due Friday, 04/14, at the beginning of class.**

**Your solution may be handwritten. Use regular sized sheets of paper, stapled together.**

**Do not forget to write your name on page 1.**

**1.** Assume that $H \lhd K \lhd G$ and $H \lhd G$.

(a) (2 points) Prove that $K/H$ is a subgroup of $G/H$.

(b) (2 points) Prove $K/H \lhd G/H$.

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

**3.** (2 points) Let $\varphi : G \to K$ be a surjective homomorphism. Let $J \lhd K$. 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.