**Math 301 – Homework 8**

Make sure you read pages 210-11 of the textbook about homomorphisms! No formulas, but good explanation of the usefulness of homomorphisms.

**Problem 10.16** Prove that there is no homomorphism from $\mathbb{Z}_8 \oplus \mathbb{Z}_2$ onto (surjective!) $\mathbb{Z}_4 \oplus \mathbb{Z}_4$.

**Problem 10.56** If $H$ and $K$ are normal subgroups of $G$ and $H \cap K = \{e\}$, prove that $G$ is isomorphic to a subgroup of $G/H \oplus G/K$.

**Problem 11.8** Show that there are two Abelian groups of order 108 that have exactly 13 subgroups of order 3. *Hint – do 11.6 first, then look at 11.7. And of course, use the Fundamental Theorem!*

**Problem 11.28** Suppose that $G$ is an Abelian group of order 16, and in computing the orders of its elements, you come across an element of order 8 and two elements of order 2. Explain why no further computations are needed to determine the isomorphism class of $G$. 