## Practice Exam 1

Modern Algebra I, Dave Bayer, February 10, 2009
Each of these problems are model questions with many possible variants, each based on groups of small order. On the actual exam, specific choices for G and H will be given.

In addition, please consult last year's first exam for Modern Algebra I.
[1] Let H be a (specific) subgroup of a (specific) group of order order $\leqslant 12$. What are the right cosets of H in G?
[2] Let H be a (specific) subgroup of a (specific) group of order order $\leqslant 12$. Is H a normal subgroup of G ? What are the conjugate subgroups $\mathrm{gHg}^{-1}$ of H in G ?
[3] Let $G$ be a (specific) group of order $\leqslant 12$. List the subgroups of $G$, and draw the lattice of subgroups by inclusion. Which subgroups are normal? What are the corresponding quotient groups? ( G will be specified on the exam.)
[4] Let G and H be (specific) groups of order order $\leqslant 12$. How many group homomorphisms can you find from $G$ to $H$ ? For each homomorphism, what is the kernel subgroup in $G$ ? What is the image subgroup in $H$ ?

