

# MATH 31 – HOMEWORK 5

due **Friday, August 4**

**Instructions:** This assignment is due at the *beginning* of class. Staple your work together (do not just fold over the corner). Please write the questions in the correct order. If I cannot read your handwriting, you won't receive full credit.

1. (10.8) Let  $G$  be a group of order  $p^2$ , where  $p$  is a prime. Show that  $G$  must have a subgroup of order  $p$ .
2. (10.21) Prove that every group of order 77 has an element of order 7 and an element of order 11.
3. (11.29) Show that if  $G/Z(G)$  is cyclic then  $G$  is abelian.
4. (11.16) Show that  $(\mathbb{Q}, +)/(\mathbb{Z}, +)$  is an infinite group every element of which has finite order.