MATH 4107 HOMEWORK #3 DUE: March 9, 2007

Work the following problems and hand in your solutions. You may work together with other people in the class, but you must each write up your solutions independently. A subset of these will be selected for grading. Write LEGIBLY on the FRONT side of the page only, and STAPLE your pages together.

1. Problem 2.6 #16.

Hint for (b): Suppose that there was an element $x \in G/P$ with $o(x) = p$, and show this leads to a contradiction.

Hint for (c): By Lagrange's Theorem, $|P| = p^k \ell$ for some k and for some ℓ that divides m. Show $k = n$ and $\ell = 1$. Direct? Contrapositive? Contradiction?

2. Problem 2.7 #5.

Note: For part a, you don't have to prove that $H \cap N$ is a subgroup, you may assume that and just prove that it is normal in H.

3. Problem 2.8 #6.

Hint: Consider $AB = \{ab : a \in A, b \in B\}$. Show that if $A \cap B = \{e\}$ then this is a listing of the elements of AB without duplication.

4. Problem 2.8 #8.

5. Problem 2.9 #2.

6. Problem 3.2 #10.

Extra Credit (up to 3 points). Problem 2.8 #11.