Collected Homework Week 8

MATH 278: Number Theory
Due March 14, 2011 at 4:00pm Name (Print): _____

1. Write a proof of Theorem 2.18 from page 33 of our text.

2. Exercise 2.22 on page 34.

3. Exercise 2.23 on page 34.

4. Prove the following: There are arbitrarily long sequences of non-primes. That is, for any $n \in \mathbb{N}$ there exists a sequence of n consecutive integers, none of which is prime. (Hint: You may find factorials useful here.)

5. If p_n denotes the nth prime number, let $d_n = p_{n+1} - p_n$. An open question is whether the equation $d_n = d_{n+1}$ has infinitely many solutions. Give five solutions. Be sure to briefly explain/show why what you have found are solutions.

Notebook Problems Week 8

(1) Prove that if n is a natural number such that $n > 2$, then there exists a prime p satisfying $n < p < n!$.

(2) Prove Theorem 2.13 on page 32.