Collected Homework Week 8

MATH 278: Number Theory
Due March 9, 2015 at 4:00pm   Name (Print): _____

1. Exercise 2.22 on page 34.

2. Exercise 2.23 on page 34.

3. 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. Try to construct a such a sequence!)

4. 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. Interpret what this question is asking into words and then give five solutions. Be sure to briefly explain/show why what you have found are solutions. Note that your handout that lists lots of primes will be useful here!

5. Prove Theorem 2.18 on page 33.

Notebook Problems Week 8

(1) Prove Theorem 2.13 on page 32.

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