Math 218: Elementary Number Theory

Homework 3 : Due September 9

§1.4 #2. If p is a prime greater than 4, prove that p has the form $4k + r$ where $r = 1$ or $r = 3$.

§1.4 #3. If $a = 4q_1 + 3$ and $b = 4q_2 + 3$ prove that $ab = 4q_3 + 1$ where q_1, q_2, and q_3 represent integers.

§1.4 # 9. Prove that 3, 7, 11 is the only set of three consecutive *primes* of the form c, $c + 4$, $c + 8$.

§1.4 # 12. If a product of primes is of the form $4q + 3$ prove that at least one of the primes must have this form. *Hint*: Use problem §1.4 # 2.

§1.3 # 10. Prove that for any positive integers k there exist sequences of k consecutive composite integers. For example, when $k = 3$, the sequence $14, 15, 16$ is 3 consecutive composite integers. *Hint*: Factorials might be your friend.