Math 2510-410 **Homework #3** **Due: Mon., Feb. 16^{th}, 2015**

1. Use induction to show that $1 + 3 + \cdots + (2n - 1) = n^2$ for all integers $n \geq 1$.
2. Prove that 8 is a factor of $9^n - 1$ for all natural numbers n.
3. Prove that $n^2 + n$ is always even [when n is an integer].
4. Prove Theorem 20 (page 80): If no natural number m such that $1 < m \leq \sqrt{p}$ divides p, then p is prime.
5. Prove Theorem 34 (page 82): The sum of any three consecutive integers is divisible by 3.