Math 441 - Homework 1 **Due Friday, Sept. 6th**

1. (10 points) Suppose p and q are integers. Recall that an integer m is even iff $m = 2k$ for some integer k and m is odd iff $m = 2k + 1$ for some integer k. Prove that if p is odd and q is odd, then pq is odd.

2. (10 points) Prove or give a counterexample: The sum of any five consecutive integers is divisible by 5.

3. (10 points) Prove that $\log_2(5)$ is irrational.

4. (5 points) Write the negation of the following logical assertion:

$$\forall \epsilon > 0, \exists \delta > 0 : |x - 4| < \epsilon \Rightarrow |f(x) - 3| < \delta.$$

5. (5 points) Write the contrapositive and the converse of the following logical assertion:

$$\text{If } p < q \text{ and } p > 0, \text{ then } \sqrt{p} < \sqrt{q}.$$