

Name: _____

Please write your solutions in an organized and systematic manner; use scratch paper to solve the problems first and then write up a neat solution with the relevant work shown.

You may use any results proved in class in your proofs. Be sure to clearly state when you do.

1. Prove that if A, B are sets and $A \cap B = A$ then $A \subseteq B$. [5 pts]

2. Suppose A, B are sets and $A \subseteq B$. Prove that $A \cup B = B$. [5 pts]

(Hint: at some point in the proof it will be useful to split into cases.)

3. Prove that the sum of two odd integers is even.

[5 pts]

4. Let x and y be integers. Show that if x is even or $y = 0$ then xy is even. [5 pts]

5. Let a and b be integers. Show that $(a + b)^2 = a^2 + b^2$ if and only if at least one of a and b is 0. [5 pts]

6. (extra credit) Let x be an integer. Prove that if 2^{2x} is an odd integer then 2^{-2x} is an odd integer. [5 pts]