EECS210 **Written HW3** **Due: 9-26-17**

Instruction: You must show your work clearly for credit.

1. (10) Let n and m be any integers. Prove that if the product nm is even, then either n is even or m is even.

2. (12) Prove that for any odd integer n, there exist integers a and b such that $n = a^2 - b^2$.

3. (12) Prove that $\sqrt[3]{2}$ is irrational.

4. (10) Prove, or disprove, that there exist two sets A and B such that $A \in B$ and $A \subseteq B$.

5. (10) Let A and B be any sets. Prove, or disprove, that if A and B have the same power set, then A = B.

6. (10) Let A, B, and C be any sets. Prove that $(B - A) \cup (C - A) = (B \cup C) - A$ using a membership table.

7. (12) Let A, B, and C be any sets. Use direct proof technique to prove that $(B - A) \cup (C - A) = (B \cup C) - A$.

8. (12) Let A, B, and C be any sets. Use direct proof technique to prove that $(A - B) - C = (A - C) - (B - C)$.

9. (12) Let A, B, and C be sets. Using Set Identities to prove that

$$\overline{(A \cap B) \cup C} = \overline{(A \cup C)} \cup \overline{(B \cup C)}.$$

9/16/17