HOMEWORK 9 - MATH 110

DUE DATE: Friday, November 22
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each problem is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Let $U = \mathbf{N}, A = \{n \in \mathbf{N} : n = 2^p 3^q \text{ for some nonnegative integers } p, q\}$ and $B = \{m \in \mathbf{N} : m = 6^r \text{ for some nonnegative integer } r\}$. Is $A = B$? Rigorously justify your answer.

2. Let $U = \{a, b, c, d, e, f, g\}, A = \{a, c, e, g\}$ and $B = \{d, e, f, g\}$. Find $A \cup B, A \cap B, A - B$ and B^c.

3. Let U be the set of all car owners in the U.S. Let F be the set of all persons in U that own a Ford and C the set of all those that own a Chevy. Describe the members of $F \cap C, F^c \cap C^c, C - F$ and F^c.

4. Let $U = \mathbf{R}, A = \{x \in \mathbf{R} : -3 \leq x < 1\}$ and $B = \{x \in \mathbf{R} : -3 < x < 3\}$. Find $A \cap B, A \cup B$ and $B - A$.

5. Let $A = \{a, b\}$ and $B = \{0, 1, 2\}$. Write the sets $A \times B, B \times (A \times B)$ and $(B \times B) \times A$.

6. Do you think that for all sets A, B, C it is true that $A \cap (B - C) = (A \cap B) - (A \cap C)$? If yes, prove it. If no, find a universe U and three sets A, B, C in U, such that the above identity fails (i.e., give a **counterexample** to the statement).