MATH 347 HW 1

due September 11, in class

PROBLEMS

1.13, 1.14, 1.32, 1.35, 1.41, 1.46 (You do not have to draw Venn diagrams for 1.41) In addition to the problems listed above, please show the following:

(1) Show that if $X \subseteq Y$, then $\mathcal{P}(X) \subseteq \mathcal{P}(Y)$.

(2) Show that
$$\mathcal{P}(X) \cap \mathcal{P}(Y) = \mathcal{P}(X \cap Y)$$
and
$$\mathcal{P}(X) \cup \mathcal{P}(Y) \subseteq \mathcal{P}(X \cup Y)$$

(3) The complement of $\varnothing$ in a set X is just X, i.e. that $\varnothing^c = X$. Similarly, show that $X^c = \varnothing$.

(4) Show the following equality of sets where A, B, X, Y are sets:
   (a) $(A \cup B) \times X = (A \times X) \cup (B \times X)$
   (b) $(A \cap B) \times (X \cap Y) = (A \times X) \cap (B \times Y)$
   (c) $(A \setminus B) \times X = (A \times X) \setminus (B \times X)$

(5) Finally, let $f : X \to Y$ be a function. Let A, B be subsets of Y. Show that

$$f^{-1}(A \cap B) = f^{-1}(A) \cap f^{-1}(B)$$

and

$$f^{-1}(A \cup B) = f^{-1}(A) \cup f^{-1}(B)$$