Math 52 Supplement to Homework Assignment 4
J. Sands First Draft Due February 13, 2009

As always, collaboration with a partner is encouraged. You may hand in a single assignment with two names on it. Style and clarity of exposition are important elements to be considered in your solutions.

Reminder: Our first test will be in class on Friday, February 27
The test will cover Chapter 1 and the supplementary material on sets. You should know how to do standard types of problems such as in the homework, without referring to your text or notes. You should also be familiar with the definitions and theorems which we have studied. There will be no questions about Mathematica on the test, but you should know the mathematical concepts which have been emphasized in the computer labs.

1. Write down all subsets of $\{a, b, c, d\}$

2. Let $S = \{x \in \mathbb{R} : x > 7\}$ and $T = \{x \in \mathbb{R} : x^3 > 100\}$. Prove that $S \subset T$.

3. Now let $S = \{x \in \mathbb{R} : x > 7\}$ and $W = \{x \in \mathbb{R} : x^3 > 343\}$. Prove that $S = W$.

4. Suppose A and B are subsets of a set U (sometimes called the universal set). Let A^c denote the complement of A in U and similarly let B^c denote the complement of B in U. The definition of A^c is $A^c = \{x \in U : x \notin A\}$. Show that the complement of $A \cup B$ is $A^c \cap B^c$, that is: $(A \cup B)^c = A^c \cap B^c$. This is also referred to as one of DeMorgan's laws, so that may give you some idea of what you need to use in order to prove it.

5. Suppose that $S = \{x \in X : P(x)\}$ and $T = \{x \in X : Q(x)\}$. Show that $S \cap T = \{x \in X : P(x) \wedge Q(x)\}$.