Homework 3

Section 1.7 Venn Diagrams: #4, A, 12
For 12, try to make it simple!

A. a. Draw a Venn diagram for the set $(A - B) \cup C$
   b. Draw a Venn diagram for the set $A - (B \cup C)$
   c. Explain what the Venn diagrams in #4 (above) and parts (a) and (b) indicate.

Section 1.8 #1, 4, ,6, 8, 9, 10, A, B

A. Let $A_n = \left(\frac{-1}{n}, \frac{1}{n}\right) \subseteq \mathbb{R}$ for $n \in \mathbb{N}$. (For clarity, A_n is an **interval** on the real line, not a point in the xy-plane.) Determine $\bigcup_{n=1}^{\infty} A_n$ and $\bigcap_{n=1}^{\infty} A_n$

B. Let $A_\alpha = \mathbb{R} - \alpha$ for $\alpha \in [0,1]$. Determine $\bigcup_{\alpha \in [0,1]} A_\alpha$ and $\bigcap_{\alpha \in [0,1]} A_\alpha$

Section 2.2 And, Or, or Not

Translate each sentence to logical symbols by reducing chunks of the language to symbolic statements (like P, Q, R) and using $\vee$, $\wedge$ or $\sim$. An example is below.

> **Sentence:** The integer n is divisible by the first three primes.
> **Answer:** Let $P(n) = n$ is divisible by 2, $Q(n) = n$ is divisible by 3, and $R(n) = n$ is divisible by 5. Now, the statement becomes $P(n) \wedge Q(n) \wedge R(n)$.

1. The function $f(x)$ is continuous but not differentiable.
2. At least one of x or y is equal to zero.
3. Each of the functions $f(x), g(x)$ and $h(x)$ contains the point $(1,2)$.

Section 2.3 Conditional Statements #1-7, A, B, C, D

The directions for problems 1-7 apply for problems A, B, C, D

A. For the integer to be even, it is sufficient that the integer is greater than 5.

B. For the bird to be black, it is necessary that the bird is a raven.

C. Whenever a series converges, the ratio test will give a value greater than 1.

D. Luna will eat a treat only if today is Tuesday.

Section 2.4 Biconditional Statements #3,4

Section 2.5 Truth Tables for Statements #1,2,3,4,7,10,11

Section 2.6 Logical Equivalence # 5,7, 10*, 11*, 12*

* Note: The directions use the word ”Decide...” The expectation is that you determine whether or not the statements are logically equivalent **and** rigorously justify your conclusion.