

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.
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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 $\bigcup_n^{\infty} A_n$ and $\bigcap_n^{\infty} A_n$
 - B. Let $A_{\alpha} = \mathbb{R} - \alpha$ for $\alpha \in [0, 1]$. Determine $\bigcup_n^{\infty} A_n$ and $\bigcap_n^{\infty} A_n$
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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 $(1, 2)$.
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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.
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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.