Math 111, Fall 2014 - Homework # 2

Due: Thursday, September 11, 2014, by 4:30 p.m.

Remember that you are required to fully explain all of your solutions.

1. Suppose that $A = \{5, 3, 7, 1, 2\}$, $B = \{1, 4, 9\}$, and $C = \{2, 4, 6\}$. Find

   (a) $A \cup B$

   (b) $A \cap C$

   (c) $A - B$

   (d) $B - C$

   (e) $A \cup (B \cap C)$

   Solution:

2. Suppose that $A = \{a, b, c\}$ and $B = \{c, d\}$. Find

   (a) $(A \times B) \cap (B \times B)$

   (b) $(A \times B) - (A \times A)$

   (c) $\mathcal{P}(A) \cap \mathcal{P}(B)$

   (d) $\mathcal{P}(B \times B)$

   (e) $\mathcal{P}(A) - \mathcal{P}(B)$

   Solution:

3. Let $A = \{0, 2, 4, 6, 8\}$ and $B = \{1, 3, 5, 7\}$ have universal set $U = \{0, 1, 2, \ldots, 8\}$. Find

   (a) $\overline{A}$

   (b) $\overline{B}$

   (c) $\overline{A} \times B$

   (d) $\overline{A \cup B}$

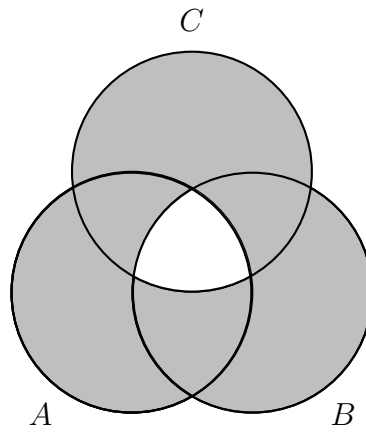   (e) $A - \overline{A}$

   Solution:

4. Suppose that sets A and B are in a universal set U. Draw Venn diagrams for each of the following:

   (a) $\overline{A \cap B}$

   (b) $\overline{A} \cap \overline{B}$

   (c) $\overline{A \cup B}$

   (d) $\overline{A} \cup \overline{B}$

   Based on these sketches, make a conjecture about the equality of these sets.

   Solution:

5. Determine the expression involving sets A, B, and C that is illustrated by the Venn diagram below.

Solution: