

1. Sets

1. Let $A = \{1, 3, 4, 5, 6, 7, 10, 12\}$, $B = \{3, 4, 7, 11, 15, 20\}$ and $C = \{4, 5, 8, 15, 20, 25\}$. Find $B \setminus (A \cap C)$, $(B \cup C) \setminus (A \setminus B)$, $(A \setminus C) \cup (B \cap C)$.
2. Let $A = \{x \in \mathbb{N} : x^2 - 3x - 10 \leq 0\}$, $B = \left\{x \in \mathbb{Z} : \frac{5-x}{4} - 2x > -1\right\}$ and $C = \{x \in \mathbb{Z} : -x^2 + 12 > x\}$. Find $C \setminus B$, $B \setminus C$, $(A \cup B) \setminus C$, $(B \cap C) \cup (A \setminus C)$.
3. Let $A = \left\{x \in \mathbb{N} : \frac{2x-4}{3} \leq 2\right\}$, $B = \{x \in \mathbb{Z} : |x+2| = 5\}$ and $C = \{x \in \mathbb{N} : 7 - 3x < -8\}$. Find $(A \setminus C) \cup (A \cap B)$.
4. Let $A = \{x \in \mathbb{R} : |4x+5| = 11\}$, $B = \{x \in \mathbb{Z} : -x^2 - 4x > 12\}$ and $C = \left\{x \in \mathbb{N} : x - \frac{x-2}{5} \leq 4\right\}$. Find $A \cap C$, $(A \cup C) \setminus B$, $(B \cup A) \setminus (C \cap B)$.
5. Given $U = \{-2, 0, 1, 2, 3, 4, 5\}$ find the complement of $A = \{x \in \mathbb{N} : -x^2 + 4x - 3 \geq 0\}$ with respect of U .
6. Find the complement of $A = \{x \in \mathbb{R} : 8x^2 - 4x - 12 > 0\}$ in \mathbb{R} .
7. Find the complement of $A = \{x \in \mathbb{R} : -2x^2 - 7x - 5 \leq 0\}$ in \mathbb{R} .
8. Given $A = \{x \in \mathbb{R} : 3x^2 + 2x - 2 < 0\}$, $B = \{x \in \mathbb{R} : (2x+5)(x-3) + 8 < (x+1)(2x+1)\}$ and $C = \left\{x \in \mathbb{R} : -x - \frac{2x-2}{3} \geq -1\right\}$. Find $A \setminus C$, $B \cap C$, $C \setminus (A \cup B)$.
9. Let $A = \{x \in \mathbb{R} : -x^2 - 2x + 12 \leq 0\}$ and $B = \left\{x \in \mathbb{R} : 6 - \frac{4x+7}{2} \leq -5\right\}$. Find the complement of $A \cup B$ in \mathbb{R} .
10. Given $A = \{x \in \mathbb{R} : -x^2 + 9 \geq 0\}$, $B = \{x \in \mathbb{R} : |x-3| \leq 3\}$ and $C = \{x \in \mathbb{R} : (x+4)(x-2) < 0\}$ find the complement of $(A \cap B) \cup C$ in \mathbb{R} . Find $\overline{C} \cap A$ and $\overline{B \cap C} \cap \overline{A}$.
11. Draw Venn diagrams illustrating $(A \cup B) \cap C$, $A \cup (B \cap C)$, $(A \cup B) \setminus C$ and $((A \cup B) \setminus C) \setminus (A \cap B)$.
12. True or false (use Venn diagrams to show):
 - a. $(A \setminus B) \cup (A \setminus C) = A \setminus (B \cap C)$
 - b. $(A \setminus B) \setminus C = (A \setminus C) \setminus (B \setminus C)$
 - c. $(A \cup B) \setminus (A \cap C) = (A \setminus C) \setminus (B \cap C)$.