

SETS

1. Draw Venn diagrams for the following sets:

a) $(A \cap B)'$

b) $A \cup B'$

c) $A \cap (A \cup B)$

d) $(A \cup B)'$

e) $A' \cap B'$

f) $A \cap (A' \cup B')$

2. Draw Venn diagrams for the following pairs of sets and hence deduce the relation between them (proper subset, equal, disjoint, neither).

a) $D = (A \cap B) \cup C$ $E = A \cap (B \cup C)$ b) $D = (A \cap B') \cap C$ $E = (A \cap C) \cap B'$

c) $D = (A' \cup B') \cap C$ $E = (A \cap B)' \cup C$ d) $D = (A \cap B)' \cap C$ $E = (A' \cap C) \cup (B' \cap C)$

3. The universal set U is defined to be $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$, and $A = \{2k + 1 \mid k \in \mathbb{N}\}$, $B = \{k \mid k \text{ is prime}\}$, $C = \{4k \mid k \in \mathbb{N}\}$.

(a) Find the following:

a) $A \cup B$

b) $A \cap B$

c) $A \cap C$

d) $A \cup C$

e) $(A \cup B)'$

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

(b) Draw a Venn diagram to illustrate the relationship between the sets A , B and C .

4. Y and Z are subsets of the universal set U . The three sets are defined as follows. $U = \{x \mid -\sqrt{2} \leq x \leq \sqrt{2}\}$, $Y = \{x \mid -1 < x < 0\}$ and $Z = \{x \mid -\frac{1}{2} \leq x \leq 1\}$. List the following sets:

a) $Y \cup Z$

b) $Y \cap Z$

c) Y'

d) $Y' \cap Z$

e) $Y \cap Z'$

5. Let $A = \{1, 2, 3\}$, $B = \{6, 8\}$ and $C = \{3, 4, 5, 6, 7, \}$.

(a) List all the elements of $(A \cap C) \cup B$ and state the value of $n((A \cap C) \cup B)$.

(b) List all the elements of $(A \cup C) \cap B$ and state the value of $n((A \cup C) \cap B)$.

(c) List all the subsets of A and state the value of $n(\mathcal{P}(A))$.

(d) List all the elements of $A \times B$ and state the value of $n(A \times B)$.