

Tutorial Sheet 1 (Sets and Numbers)

1. List the members of the following sets.
 - a) $\{x : x \text{ is a positive integer, } x \leq 12\}$
 - b) $\{x : x \text{ is the square of a positive integer, } x < 100\}$
 - c) $\{x : x \text{ is an integer, } x^2 = 2\}$

2. Which of the following sets are equal?
 - a) $\{1, 2, 3\}$
 - b) $\{3, 2, 1\}$
 - c) $\{1, 2, 2, 3, 3, 3\}$
 - d) $\{1, 3, 5\}$
 - e) $\{0, 1, 3, 5\}$
 - f) $\{5, 0, 3, 0, 5, 1, 1, 1, 5\}$

3. Consider the following sets:
 $A = \{1, 2\}$, $B = \{1, 2, 3\}$, $C = \{1, 3, 5\}$, $D = \{2, 4, 6\}$, $U = \{0, 1, 2, 3, 4, 5, 6\}$, \emptyset

Insert the symbol \subset or $\not\subset$ between each pair of the sets:

 - a) A, B
 - b) B, C
 - c) C, D
 - d) A, \emptyset
 - e) \emptyset, A
 - f) D, U
 - g) C, B
 - h) U, C

4. Let U be the universal set and A, B , and C be subsets of U with:

$$U = \{x : x \in \text{integer, } 1 \leq x \leq 100\},$$

$$A = \{1, 2, 5\}, B = \{2, 5, 8, 9\}, C = \{1, 8\} \text{ and } D = \{2, 5, 9\}.$$

Find

 - a) $A \cup B$
 - b) $C \cup D$
 - c) $A \cap B$
 - d) $C \cap D$
 - e) $A \setminus B$
 - f) $B \setminus A$
 - g) $A \cup B \cup C$
 - h) $A \cup (B \cap D)$
 - i) $\overline{(B \setminus A) \cup (C \cap D)}$

5. Use Venn diagrams to represent each of the following set expression.
 - a) $A \subset B$
 - b) $A \cap \overline{B}$
 - c) $A \cap (B \cup C)$
 - d) $(A \cup B) \setminus (B \cap C)$
 - e) $\overline{A \cup B \cup C}$