Sets Overview & Operations

Example Problems and Solutions: Set Operations

Union of Sets

Problem 1:
Given sets $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, find $A \cup B$.

Solution:
The union of sets A and B includes all elements from both sets, with duplicates removed.

$$A \cup B = \{1, 2, 3, 4, 5\}$$

Problem 2:
Given sets $C = \{a, b, c\}$ and $D = \{c, d, e\}$, find $C \cup D$.

Solution:
The union of sets C and D includes all elements from both sets, with duplicates removed.

$$C \cup D = \{a, b, c, d, e\}$$

Intersection of Sets

Problem 1:
Given sets $E = \{1, 2, 3, 4\}$ and $F = \{3, 4, 5, 6\}$, find $E \cap F$.

Solution:
The intersection of sets E and F includes only the elements that are present in both sets.

$$E \cap F = \{3, 4\}$$

Problem 2:
Given sets $G = \{x, y, z\}$ and $H = \{a, b, z\}$, find $G \cap H$.

Solution:
The intersection of sets G and H includes only the elements that are present in both sets.

$$G \cap H = \{z\}$$

Difference of Sets

Problem 1:
Given sets $I = \{1, 2, 3, 4, 5\}$ and $J = \{2, 4, 6\}$, find $I - J$.

Solution:
The difference $I - J$ includes all elements that are in I but not in J.

$$I - J = \{1, 3, 5\}$$

Problem 2:
Given sets $K = \{a, b, c, d\}$ and $L = \{b, d, e\}$, find $K - L$.

Solution:
The difference $K - L$ includes all elements that are in K but not in L.

$$K - L = \{a, c\}$$

Complement of a Set

Problem 1:
Given the universal set $U = \{1, 2, 3, 4, 5, 6, 7\}$ and set $M = \{2, 4, 6\}$, find the complement of M (denoted as M').

Solution:
The complement of set M includes all elements in the universal set U that are not in M.

$$M' = \{1, 3, 5, 7\}$$

Problem 2:
Given the universal set $U = \{a, b, c, d, e\}$ and set $N = \{a, d\}$, find the complement of N (denoted as N').

Solution:
The complement of set N includes all elements in the universal set U that are not in N.

$$N' = \{b, c, e\}$$