

## Solution to Practice Questions Lecture No. 7 to 9

### Solution 1:

$$U = \{a, b, c, d, e, f, g\}$$

$$A = \{a, c, e, g\}$$

$$B = \{d, e, f, g\}$$

$$A \cup B = \{a, c, e, g\} \cup \{d, e, f, g\} = \{a, c, d, e, f, g\}$$

$$A \cap B = \{a, c, e, g\} \cap \{d, e, f, g\} = \{e, g\}$$

$$B - A = \{d, e, f, g\} - \{a, c, e, g\} = \{d, f\}$$

$$A^c = U - A = \{a, b, c, d, e, f, g\} - \{a, c, e, g\} = \{b, d, f\}$$

### Solution 2:

$$A = \{x \in \mathbb{Z} \mid 0 < x \leq 2\}$$

$$B = \{x \in \mathbb{Z} \mid 1 \leq x < 4\}$$

$$C = \{x \in \mathbb{Z} \mid 3 \leq x < 9\}$$

$$A \cup B = \{x \in \mathbb{Z} \mid 0 < x \leq 2\} \cup \{x \in \mathbb{Z} \mid 1 \leq x < 4\} = \{x \in \mathbb{Z} \mid 0 < x \leq 4\}$$

$$(A \cup B)^c = U - A \cup B = \{x \in \mathbb{Z} \mid -\infty < x < \infty\} - \{x \in \mathbb{R} \mid 0 < x \leq 4\} = \{x \in \mathbb{R} \mid x \leq 0 \text{ and } x > 4\}$$

$$A \cap B = \{x \in \mathbb{R} \mid 0 < x \leq 2\} \cap \{x \in \mathbb{R} \mid 1 \leq x < 4\} = \{x \in \mathbb{R} \mid 1 \leq x \leq 2\}$$

$$(A \cap B)^c = U - A \cap B = \{x \in \mathbb{R} \mid -\infty < x < \infty\} - \{x \in \mathbb{R} \mid 1 \leq x \leq 2\} = \{x \in \mathbb{R} \mid x < 1 \text{ and } x > 2\}$$

$$A^c = U - A = \{x \in \mathbb{R} \mid -\infty < x < \infty\} - \{x \in \mathbb{R} \mid 0 < x \leq 2\} = \{x \in \mathbb{R} \mid x \leq 0 \text{ and } x > 2\}$$

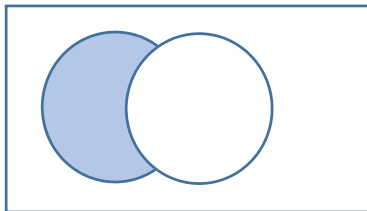
$$B^c = U - B = \{x \in \mathbb{R} \mid -\infty < x < \infty\} - \{x \in \mathbb{R} \mid 1 \leq x < 4\} = \{x \in \mathbb{R} \mid x < 1 \text{ and } x \geq 4\}$$

$$A^c \cup B^c = \{x \in \mathbb{R} \mid x \leq 0 \text{ and } x > 2\} \cup \{x \in \mathbb{R} \mid x < 1 \text{ and } x \geq 4\} = \{x \in \mathbb{R} \mid x < 1 \text{ and } x > 2\}$$

$$A^c \cap B^c = \{x \in \mathbb{R} \mid x \leq 0 \text{ and } x > 2\} \cap \{x \in \mathbb{R} \mid x < 1 \text{ and } x \geq 4\} = \{x \in \mathbb{R} \mid x < 0 \text{ and } x > 4\}$$

### Solution 3:

y will be in the shaded area



**Solution 4:**

The membership table for the given identity is as shown below.

A	B	$A \square B$	$(A-B)$	$A-(A-B)$
1	1	1	0	1
1	0	0	1	0
0	1	0	0	0
0	0	0	0	0

It can clearly be seen from the 3<sup>rd</sup> and 5<sup>th</sup> columns that the given equation holds true.

**Solution 5:**

Given that

A = Numbers divisible by 4 and less than 20.

$$A = \{4, 8, 12, 16\}$$

B = Positive even numbers less than 20.

$$B = \{2, 4, 6, 8, 10, 12, 14, 16, 18\}$$

Then

$$(a) A \cap B = \{4, 8, 12, 16\}$$

$$(b) B - A = \{2, 6, 10, 14, 18\}$$