

DISCRETE MATHEMATICS ASSIGNMENT - 1

ANSWERS

$$\textcircled{1} \quad A = \{1, 2, 3, 4, 5\}$$

$$B = \{0, 3, 6\}$$

$$\begin{aligned} \text{a) } A \cup B &= \{0, 1, 2, 3, 4, 5, 6\} \\ \text{b) } A \cap B &= \{3\} \\ \text{c) } A - B &= \{1, 2, 4, 5\} \\ \text{d) } B - A &= \{0, 6\} \end{aligned}$$

$$\textcircled{2} \quad A - B = \{1, 5, 7, 8\}$$

$$B - A = \{2, 10\}$$

$$A \cap B = \{3, 6, 9\}$$

$$\begin{aligned} A &= (A - B) \cup (A \cap B) \\ &= \{1, 3, 5, 6, 7, 8, 9\} \end{aligned}$$

$$\begin{aligned} B &= (B - A) \cup (A \cap B) \\ &= \{2, 3, 6, 9, 10\} \end{aligned}$$

$\textcircled{3}$	A	B	$A \cup B$	$A \cap (A \cup B)$
	1	0	1	1
	1	1	1	1
	0	0	0	0
	0	1	1	0

\Rightarrow The membership table gives
 $A \cap (A \cup B) = A$

Hence Proved.

$$\begin{aligned} 4) \quad A &= \{0, 2, 4, 6, 8, 10\} \\ B &= \{0, 1, 2, 3, 4, 5, 6\} \\ C &= \{4, 5, 6, 7, 8, 9, 10\} \end{aligned}$$

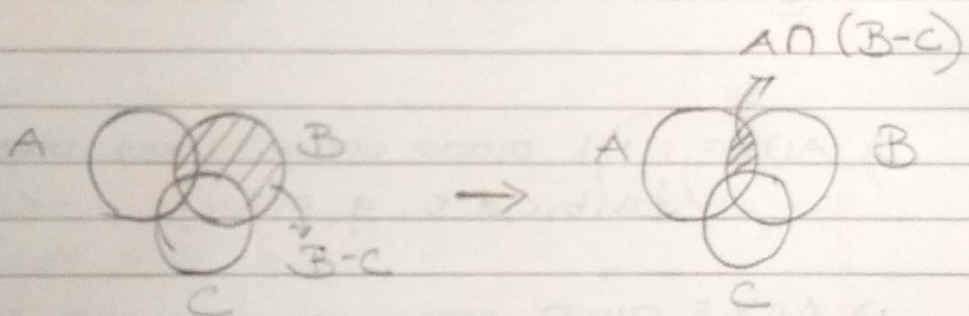
$$\begin{aligned} a) \quad A \cap B &= \{0, 2, 4, 6\} \\ (A \cap B) \cap C &= \{4, 6\} \end{aligned}$$

$$b) \quad A \cup B \cup C = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

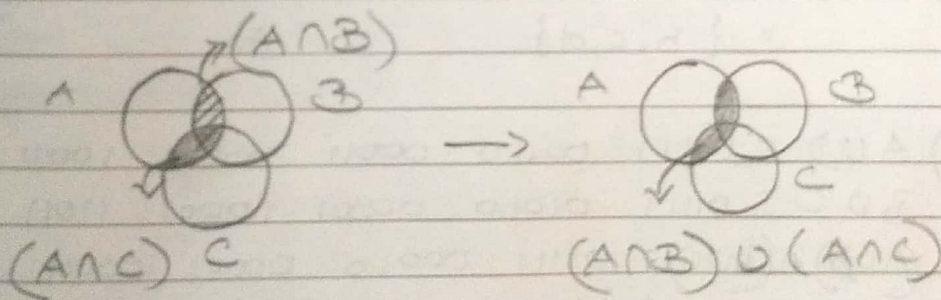
$$\begin{aligned} c) \quad A \cup B &= \{0, 1, 2, 3, 4, 5, 6, 8, 10\} \\ (A \cup B) \cap C &= \{4, 5, 6, 8, 10\} \end{aligned}$$

$$\begin{aligned} d) \quad A \cap B &= \{0, 2, 4, 6\} \\ (A \cap B) \cup C &= \{0, 2, 4, 5, 6, 7, 8, 9, 10\} \end{aligned}$$

5)
a)



b)



c)

⑥ a) $00111\ 00000$
 b) 1010010001

⑦ $A = \{a, b, c, d, e\}$

$A_B = 1111\ 00000\ 00000\ 00000\ 00000\ 0$

$B = \{b, c, d, g, p, t, v\}$

$B_B = 01110\ 01000\ 00000\ 10001\ 01000\ 0$

$C = \{c, e, i, o, u, x, y, \eta\}$

$C_B = 00101\ 00010\ 00001\ 00000\ 10011\ 1$

$D = \{d, e, h, i, m, o, t, u, x, y\}$

$D_B = 00011\ 00110\ 00011\ 00001\ 10011\ 0$

a) $A \cup B = 11111\ 01000\ 00000\ 10001\ 01000\ 0$
 $= \{a, b, c, d, e, g, p, t, v\}$

b) $A \cap B = 01110\ 00000\ 00000\ 00000\ 0$
 $= \{b, c, d\}$

c) $A \cup D = 11111\ 00110\ 00011\ 00001\ 10011\ 0$

$B \cup C = 01111\ 01010\ 00001\ 10001\ 11011\ 1$

$(A \cup D) \cap (B \cup C) = 01111\ 00010\ 00001\ 00001\ 10011\ 0$
 $= \{b, c, d, e, i, o, t, u, x, y\}$

d) $A \cup B \cup C \cup D = 11111\ 01110\ 00011\ 10001\ 11011\ 1$
 $= \{a, b, c, d, e, g, h, i, m, o, p, t, u, v, x, y\}$

⑧

$$\begin{aligned}
 a) \quad A \times B &= (a, x), (a, y), (b, x), (b, y), (c, x), (c, y) \\
 A \times B \times C &= \left\{ (a, x, 0), (a, x, 1), (a, y, 0), (a, y, 1), \right. \\
 &\quad \left. (b, x, 0), (b, x, 1), (b, y, 0), (b, y, 1), \right. \\
 &\quad \left. (c, x, 0), (c, x, 1), (c, y, 0), (c, y, 1) \right\}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad C \times B &= (0, x), (0, y), (1, x), (1, y) \\
 C \times B \times A &= \left\{ (0, x, a), (0, x, b), (0, x, c), \right. \\
 &\quad \left. (0, y, a), (0, y, b), (0, y, c), \right. \\
 &\quad \left. (1, x, a), (1, x, b), (1, x, c), \right. \\
 &\quad \left. (1, y, a), (1, y, b), (1, y, c) \right\}
 \end{aligned}$$

$$\begin{aligned}
 ⑨ \quad \text{Domain} &= \mathbb{Z}^+ [0, \infty) \\
 \text{Range} &= \mathbb{Z}^+ [0, \infty)
 \end{aligned}$$

⑩a) One to one but not onto
 $f(x) = 2x$ is an example of one to one but not onto function

b) Auto but not one to one

$$\text{Since } f(1) = f(2) = 1$$

Since elements 1 & 2 have same image 1,

$\therefore f$ is not one to one

$$f(x) = y, \quad y \in \mathbb{N}$$

$\therefore f$ is onto.