



Functions Ex 3.1 Q5

We have,

$$f(x) = \begin{cases} 3x - 2, & x < 0 \\ 1, & x = 0 \\ 4x + 1, & x > 0 \end{cases}$$

Now,

$$f(1) = 4 \times 1 + 1 = 5,$$

$$f(-1) = 3 \times (-1) - 2 = -3 - 2 = -5,$$

$$f(0) = 1,$$

$$\text{and, } f(2) = 4 \times 2 + 1 = 9$$

$$\therefore \quad \begin{array}{ll} f(1) = 5, & f(-1) = -5, \\ f(0) = 1, & f(2) = 9, \end{array}$$

Functions Ex 3.1 Q6

We have,

$$f(x) = x^2 \quad \text{--- (i)}$$

(a) clearly range of $f = \mathbb{R}^+$ (set of all real numbers greater than or equal to zero)

(b) we have,

$$\{x : f(x) = 4\}$$

$$\Rightarrow f(x) = 4 \quad \text{--- (ii)}$$

Using equation (i) and equation (ii), we get

$$x^2 = 4$$

$$\Rightarrow x = \pm 2$$

$$\therefore \{x : f(x) = 4\} = \{-2, 2\}$$

$$(c) \{y : f(y) = -1\}$$

$$\Rightarrow f(y) = -1 \quad \text{--- (iii)}$$

Clearly, $x^2 \neq -1$ or $x^2 \geq 0$

$$\Rightarrow f(y) \neq -1$$

$$\therefore \{y : f(y) = -1\} = \emptyset$$

Functions Ex 3.1 Q7

We have,

$$f = R^+ \rightarrow R$$

and $f(x) = \log_e x$ --- (i)

(a) Now,

$$f = R^+ \rightarrow R$$

\therefore the image set of the domain of $f = R$

(b) Now,

$$\{x : f(x) = -2\}$$

$$\Rightarrow f(x) = -2$$

--- (ii)

Using equation (i) and equation (ii), we get

$$\log_e x = -2$$

$$\Rightarrow x = e^{-2}$$

$[\because \log_e b = c \Rightarrow b = a^c]$

$$\therefore \{x : f(x) = -2\} = \{e^{-2}\}$$

(c) Now,

$$f(xy) = \log_e(xy)$$

$$= \log_e x + \log_e y$$

$$f(x) + f(y)$$

$$\therefore f(xy) = f(x) + f(y)$$

$[f(x) = \log_e x]$
 $[\because \log mn = \log m + \log n]$

Yes, $f(xy) = f(x) + f(y)$.

Functions Ex 3.1 Q8

(a) we have,

$$\{(x, y) = y = 3x, x \in \{1, 2, 3\}, y \in \{3, 6, 9, 12\}\}$$

Putting $x = 1, 2, 3$ in $y = 3x$, we get
 $y = 3, 6, 9$ respectively

$$\therefore R = \{(1, 3), (2, 6), (3, 9)\}$$

Yes, it is a function.

(b) we have,

$$\{(x, y) : y > x + 1, x = 1, 2 \text{ and } y = 2, 4, 6\}$$

Putting $x = 1, 2$ in $y > x + 1$, we get
 $y > 2, y > 3$ respectively.

$$\therefore R = \{(1, 4), (1, 6), (2, 4), (2, 6)\}$$

It is not a function from A to B because two ordered pairs in R have the same first element.

(c) we have,

$$\{(x, y) = x + y = 3, x, y \in \{0, 1, 2, 3\}\}$$

Now,

$$y = 3 - x$$

Putting $x = 0, 1, 2, 3$, we get
 $y = 3, 2, 1, 0$ respectively

$$\therefore R = \{(0, 3), (1, 2), (2, 1), (3, 0)\}$$

Yes, this relation is a function.

Functions Ex 3.1 Q9

We have,

$$f : R \rightarrow R \text{ and } g : C \rightarrow C$$

$$\therefore \text{Domain } (f) = R \text{ and Domain } (g) = C$$

$$\therefore \text{Domain } (f) \neq \text{Domain } (g) = C$$

$$\therefore f(x) \text{ and } g(x) \text{ are not equal functions.}$$

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