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,

$$f(1) = 4 \times 1 + 1 = 5,$$
$$f(-1) = 3 \times (-1) - 2 = -3 - 2 = -5,$$
$$f(0) = 1,$$
and, $f(2) = 4 \times 2 + 1 = 9$

$\therefore$ $f(1) = 5$, $f(-1) = -5$,
$f(0) = 1$, $f(2) = 9$,

Functions Ex 3.1 Q6

We have,

$f(x) = x^2$ ---(i)

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

(b) we have,

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

$\Rightarrow$ $f(x) = 4$ ---(ii)

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

$x^2 = 4$

$\Rightarrow$ $x = \pm 2$

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

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

$\Rightarrow$ $f(y) = -1$ ---(iii)

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

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

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

Functions Ex 3.1 Q7

We have,

$f = R^+ \to R$

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

(a) Now,

$f = R^+ \to R$

$\therefore$ 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

$\log_e x = -2$

$\Rightarrow$ $x = e^{-2}$ $\left[\because \log_e b = c \Rightarrow b = a^c\right]$

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

(c) Now,

$f(xy) = \log_e (xy)$ $\left[f(x) = \log_e x\right]$

$= \log_e x + \log_e y$ $\left[\because \log mn = \log m + \log n\right]$

$f(x) + f(y)$

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

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,

$f : R \to R$ and $g : c \to c$

$\therefore$ Domain $(f) = R$ and Domain $(g) = c$

$\therefore$ Domain $(f) \neq$ Domain $(g) = c$

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

********** END **********