



Functions Ex 3.1 Q10

(i) We have,

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

Range of $f(x) = \mathbb{R}^+$ (set of all real numbers greater than or equal to zero)
 $= \{x \in \mathbb{R} \mid x \geq 0\}$

(ii) We have,

$$g(x) = \sin x$$

Range of $g(x) = \{x \in \mathbb{R} : -1 \leq x \leq 1\}$

(iii) We have,

$$h(x) = x^2 + 1$$

Range of $h(x) = \{x \in \mathbb{R} : x \geq 1\}$

Functions Ex 3.1 Q11

(a) We have,

$$f_1 = \{(1, 1), (2, 11), (3, 1), (4, 15)\}$$

f_1 is a function from X to Y .

(b) We have,

$$f_2 = \{(1, 1), (2, 7), (3, 5)\}$$

f_2 is not a function from X to Y because there is an element $4 \in X$ which is not associated to any element of Y .

(c) We have,

$$f_3 = \{(1, 5), (2, 9), (3, 1), (4, 5), (2, 11)\}$$

f_3 is not a function from X to Y because an element $2 \in X$ is associated to two elements 9 and 11 in Y .

Functions Ex 3.1 Q12

We have,

$$f(x) = \text{highest prime factor of } x.$$

$$\begin{aligned} \therefore \quad 12 &= 3 \times 4, \\ 13 &= 13 \times 1, \\ 14 &= 7 \times 2, \\ 15 &= 5 \times 3, \\ 16 &= 2 \times 8, \\ 17 &= 17 \times 1 \end{aligned}$$

$$\therefore \quad f = \{(12, 3), (13, 13), (14, 7), (15, 5), (16, 2), (17, 17)\}$$

$$\therefore \quad \text{Range}(f) = \{3, 13, 7, 5, 2, 17\}$$

Functions Ex 3.1 Q13

We know that,

$$\text{if } f: A \rightarrow 13$$

such that $y \in 3$. Then,

$$f^{-1}(y) = \{x \in A : f(x) = y\}. \text{ In other words, } f^{-1}(y) \text{ is the set of pre-images of } y.$$

Let $f^{-1}\{17\} = x$. Then, $f(x) = 17$

$$\Rightarrow x^2 + 1 = 17$$

$$\Rightarrow x^2 = 17 - 1 = 16$$

$$\Rightarrow x = \pm 4$$

Let $f^{-1}\{-3\} = x$. Then, $f(x) = -3$

$$\Rightarrow x^2 + 1 = -3$$

$$\Rightarrow x^2 = -3 - 1 = -4$$

$$\Rightarrow x = \sqrt{-4}$$

$$\therefore f^{-1}\{-3\} = \emptyset$$

Functions Ex 3.1 Q14

We have,

$$A = \{p, q, r, s\} \text{ and } B = \{1, 2, 3\}$$

(a) Now,

$$R_1 = \{(p, 1), (q, 2), (r, 1), (s, 2)\}$$

R_1 is a function

(b) Now,

$$R_2 = \{(p, 1), (q, 1), (r, 1), (s, 1)\}$$

R_2 is a function

(c) Now,

$$R_3 = \{(p, 1), (q, 2), (p, 2), (s, 3)\}$$

R_3 is not a function because an element $p \in A$ is associated to two elements 1 and 2 in B .

(d) Now,

$$R_4 = \{(p, 2), (q, 3), (r, 2), (s, 2)\}$$

R_4 is a function.

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