



Functions Ex2.2 Q2

Let $f = \{(3, 1), (9, 3), (12, 4)\}$ and

$$g = \{(1, 3), (3, 3), (4, 9), (5, 9)\}$$

Now,

$$\text{range of } f = \{1, 3, 4\}$$

$$\text{domain of } f = \{3, 9, 12\}$$

$$\text{range of } g = \{3, 9\}$$

$$\text{domain of } g = \{1, 3, 4, 5\}$$

since, $\text{range of } f \subseteq \text{domain of } g$

$\therefore g \circ f$ is well defined.

Again, $\text{range of } g \subseteq \text{domain of } f$

$\therefore f \circ g$ is well defined.

$$\text{Now } g \circ f = \{(3, 3), (9, 3), (12, 9)\}$$

$$f \circ g = \{(1, 1), (3, 1), (4, 3), (5, 3)\}$$

Functions Ex2.2 Q3

We have,

$$f = \{(1, -1), (4, -2), (9, -3), (16, 4)\} \text{ and}$$

$$g = \{(-1, -2), (-2, -4), (-3, -6), (4, 8)\}$$

Now,

$$\text{Domain of } f = \{1, 4, 9, 16\}$$

$$\text{Range of } f = \{-1, -2, -3, 4\}$$

$$\text{Domain of } g = \{-1, -2, -3, 4\}$$

$$\text{Range of } g = \{-2, -4, -6, 8\}$$

Clearly range of f = domain of g

$\therefore g \circ f$ is defined.

but, range of $g \neq$ domain of f

$\therefore f \circ g$ is not defined.

Now,

$$g \circ f(1) = g(-1) = -2$$

$$g \circ f(4) = g(-2) = -4$$

$$g \circ f(9) = g(-3) = -6$$

$$g \circ f(16) = g(4) = 8$$

$$\therefore g \circ f = \{(1, -2), (4, -4), (9, -6), (16, 8)\}$$

Functions Ex2.2 Q4

$$A = \{a, b, c\}, B = \{u, v, w\} \text{ and}$$

$f = A \rightarrow B$ and $g : B \rightarrow A$ defined by

$$f = \{(a, v), (b, u), (c, w)\} \text{ and}$$

$$g = \{(u, b), (v, a), (w, c)\}$$

For both f and g , different elements of domain have different images

$\therefore f$ and g are one-one

Again for each element in co-domain of f and g , there is a pre image in domain

$\therefore f$ and g are onto

Thus, f and g are bijectives.

Now,

$$g \circ f = \{(a, a), (b, b), (c, c)\} \text{ and}$$

$$f \circ g = \{(u, u), (v, v), (w, w)\}$$

Functions Ex2.2 Q5

We have, $f : R \rightarrow R$ given by $f(x) = x^2 + 8$ and

$g : R \rightarrow R$ given by $g(x) = 3x^3 + 1$

$$\begin{aligned}\therefore f \circ g(x) &= f(g(x)) = f(3x^3 + 1) \\ &= (3x^3 + 1)^2 + 8\end{aligned}$$

$$\therefore f \circ g(2) = (3 \times 8 + 1)^2 + 8 = 625 + 8 = 633$$

Again

$$\begin{aligned}g \circ f(x) &= g(f(x)) = g(x^2 + 8) \\ &= 3(x^2 + 8)^3 + 1\end{aligned}$$

$$\therefore g \circ f(1) = 3(1 + 8)^3 + 1 = 2188$$

Functions Ex2.2 Q6

We have, $f : R^+ \rightarrow R^+$ given by

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

$g : R^+ \rightarrow R^+$ given by

$$g(x) = \sqrt{x}$$

$$\therefore f \circ g(x) = f(g(x)) = f(\sqrt{x}) = (\sqrt{x})^2 = x$$

Also,

$$g \circ f(x) = g(f(x)) = g(x^2) = \sqrt{x^2} = x$$

Thus,

$$f \circ g(x) = g \circ f(x)$$

Functions Ex2.2 Q7

We have, $f : R \rightarrow R$ and $g : R \rightarrow R$ are two functions defined by

$$f(x) = x^2 \text{ and } g(x) = x + 1$$

Now,

$$f \circ g(x) = f(g(x)) = f(x + 1) = (x + 1)^2$$

$$\therefore f \circ g(x) = x^2 + 2x + 1 \dots\dots\dots (i)$$

$$g \circ f(x) = g(f(x)) = g(x^2) = x^2 + 1 \dots\dots\dots (ii)$$

from (i) & (ii)

$$f \circ g \neq g \circ f$$

***** END *****

