

Functions Ex 2.3 Q 1(i)

$$f(x) = e^x$$
 and $g(x) = log_e x$

Now,
$$f \circ g(x) = f(g(x)) = f(\log_e x) = e^{\log_e x} = x$$

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

$$g \circ f(x) = g(f(x)) = g(e^x) = \log_e e^x = x$$

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

Functions Ex 2.3 Q 1(ii)

$$f(x) = x^2$$
, $g(x) = \cos x$

Domain of f and Domain of g = R

Range of $f = (0, \infty)$

Range of g = (-1, 1)

∴ Range of $f \subset \text{domain of } g \Rightarrow g \circ f \text{ exist}$ Range of $g \subset \text{domain of } f \Rightarrow f \circ g \text{ exist}$

Now,

$$g \circ f(x) = g(f(x)) = g(x^2) = \cos x^2$$

And

$$f \circ g(x) = f(f(x)) = f(\cos x) = \cos^2 x$$

Functions Ex 2.3 Q1(iii)

$$f(x) = |x|$$
 and $g(x) = \sin x$

Range of $f = (0, \infty) \subset$ Domain $g(R) \Rightarrow g \circ f$ exist Range of $g = [-1, 1] \subset$ Domain of $(R) \Rightarrow f \circ g$ exist

Now,

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

And

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

Functions Ex 2.3 Q1(iv)

$$f(x) = x + 1$$
 and $g(x) = e^x$

Range of $f = R \subset Domain of g = R \Rightarrow g \circ f$ exist Range of $g = (0, \infty) \subset Domain of f = R \Rightarrow f \circ g$ exist

Now,

$$g \circ f(x) = g(f(x)) = g(x+1) = e^{x+1}$$

And

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

Functions Ex 2.3 Q1(v)

$$f(x) = \sin^{-1}x$$
 and $g(x) = x^2$

Range of
$$f = \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \subset \text{Domain of } g = R \Rightarrow g \circ f \text{ exist}$$

Range of $g = (0, \infty) \subseteq Domain of f = R \Rightarrow f \circ g$ exist

Now,

$$f \circ g(x) = f(g(x)) = f(x^2) = sin^{-1}x^2$$

And

$$g \circ f(x) = g(f(x)) = g(\sin^{-1}x) = (\sin^{-1}x)^2$$

Functions Ex 2.3 Q 1(vi)

$$f(x) = x + 1$$
 and $g(x) = sin x$

Range of $f = R \subset Domain of g = R \Rightarrow g \circ f$ exists Range of $g = [-1,1] \subset Domain of f = R \Rightarrow f \circ g$ exists

Now,

$$f \circ g(x) = f(g(x)) = f(\sin x) = \sin x + 1$$

And

$$g \circ f(x) = g(f(x)) = g(x+1) = sin(x+1)$$

Functions Ex 2.3 Q1(vii)

$$f(x) = x + 1$$
 and $g(x) = 2x + 3$

Range of $f = R \subseteq Domain of g = R \Rightarrow g \circ f exist$

Range of $g = R \subseteq Domain of R = R \Rightarrow f \circ g$ exist

Now,

$$f \circ g(x) = f(g(x)) = f(2x + 3) = (2x + 3) + 1 = 2x + 4$$

And

$$g \circ f(x) = g(f(x)) = g(x+1) = 2(x+1) + 3$$

$$\Rightarrow$$
 $g \circ f(x) = 2x + 5$

Functions Ex 2.3 Q1(viii)

$$f(x) = c$$
, $c \in R$ and $g(x) = \sin x^2$

Range of $f = R \subset Domain of g = R \Rightarrow g \circ f$ exist Range of $g = [-1, 1] \subset Domain of <math>f = R \Rightarrow f \circ g$ exist

Now,

$$g \circ f(x) = g(f(x)) = g(c) = sinc^2$$

And

$$f \circ g(x) = f(g(x)) = f(\sin x^2) = c$$

Functions Ex 2.3 Q1(ix)

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

Range of $f = (2, \infty) \subset \text{Domain of } g = R \Rightarrow g \circ f \text{ exist}$ Range of $g = R - [1] \subset \text{Domain of } f = R \Rightarrow f \circ g \text{ exist}$

Now,

$$f \circ g(x) = f(g(x)) = f\left(\frac{-x}{1-x}\right) = \frac{x^2}{(1-x)^2} + 2$$

And

$$g \circ f(x) = g(f(x)) = g(x^2 + 2) = \frac{-(x^2 + 2)}{1 - (x^2 + 2)}$$

$$\Rightarrow g \circ f(x) = \frac{x^2 + 2}{x^2 + 1}$$

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