Functions Ex 3.2 Q1

We have,

$$f(x) = x^2 - 3x + 4$$

Now,

$$f(2x+1) = (2x+1)^2 - 3(2x+1) + 4$$
$$= 4x^2 + 1 + 4x - 6x - 3 + 4$$
$$= 4x^2 - 2x + 2$$

It is given that

$$f(x) = f(2x+1)$$
$$\Rightarrow \quad x^2 - 3x + 4 = 4x^2 - 2x + 2$$
$$\Rightarrow \quad 0 = 4x^2 - x^2 - 2x + 3x + 2 - 4$$
$$\Rightarrow \quad 3x^2 + x - 2 = 0$$
$$\Rightarrow \quad 3x^2 + 3x - 2x - 2 = 0$$
$$\Rightarrow \quad 3x(x+1) - 2(x+1) = 0$$
$$\Rightarrow \quad (x+1)(3x-2) = 0$$
$$\Rightarrow \quad x + 1 = 0 \quad \text{or} \quad 3x - 2 = 0$$
$$\Rightarrow \quad x = -1 \quad \text{or} \quad x = \frac{2}{3}$$

Functions Ex 3.2 Q2

We have,

$$f(x) = (x-a)^2 (x-b)^2$$

Now,

$$f(a+b) = (a+b-a)^2 (a+b-b)^2$$
$$= b^2 a^2$$
$$\Rightarrow \quad f(a+b) = a^2 b^2$$

Functions Ex 3.2 Q3

We have,

$$y = f(x) = \frac{ax - b}{bx - a}$$

$$\Rightarrow \quad y = \frac{ax - b}{bx - a}$$

$$\Rightarrow \quad y(bx - a) = ax - b$$

$$\Rightarrow \quad xyb - ay = ax - b$$

$$\Rightarrow \quad xyb - ax = ay - b$$

$$\Rightarrow \quad x(by - a) = ay - b$$

$$\Rightarrow \quad x = \frac{ay - b}{by - a}$$

$$\Rightarrow \quad x = f(y)$$

Hence, proved

Functions Ex 3.2 Q4

We have,

$$f(x) = \frac{1}{1 - x}$$

Now,

$$f\{f(x)\} = f\left\{\frac{1}{1 - x}\right\}$$

$$= \frac{1}{1 - \frac{1}{1 - x}}$$

$$= \frac{1}{\frac{1 - x - 1}{1 - x}}$$

$$= \frac{1 - x}{-x}$$

$$= \frac{x - 1}{x}$$

$$\therefore \quad f[f\{x\}] = f\left\{\frac{x - 1}{x}\right\}$$

$$= \frac{1}{1 - \left(\frac{x - 1}{x}\right)}$$

$$= \frac{1}{\frac{x - x + 1}{x}}$$

$$= \frac{x}{1}$$

$$= x$$

$\therefore \quad f[f(x)] = x$ Hence, proved.

Functions Ex 3.2 Q5

We have,

$$f(x) = \frac{x+1}{x-1}$$

Now,

$$f[f(x)] = f\left(\frac{x+1}{x-1}\right)$$

$$= \frac{\left(\frac{x+1}{x-1}\right)+1}{\left(\frac{x+1}{x-1}\right)-1}$$

$$= \frac{\frac{x+1+x-1}{x-1}}{\frac{x+1-1(x-1)}{x-1}}$$

$$= \frac{\frac{2x}{x-1}}{\frac{x+1-x+1}{x-1}}$$

$$= \frac{2x}{2}$$

$$= x$$

$\therefore \quad f[f(x)] = x$ Hence, proved.

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