Functions Ex 3.3 Q1

We have,

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

Clearly, $f(x)$ assumes real values for all real values for all x except for the values of $x = 0$

Hence, $\text{Domain}(f) = R - \{0\}$

We have,

$$f(x) = \frac{1}{x-7}$$

Clearly, $f(x)$ assumes real values for all real values for all x except for the values of x satisfying $x - 7 = 0$ i.e., $x = 7$

Hence, $\text{Domain}(f) = R - \{7\}$

We have,

$$f(x) = \frac{3x-2}{x+1}$$

We observe that $f(x)$ is a rational function of x as $\frac{3x-2}{x+1}$ is a rational expression.

Clearly, $f(x)$ assumes real values for all x except for the values of x for which $x + 1 = 0$ i.e., $x = -1$

Hence, $\text{Domain} = R - \{-1\}$

We have,

$$\begin{aligned} f(x) &= \frac{2x+1}{x^2-9} \\ &= \frac{2x+1}{(x^2-3^2)} \\ &= \frac{2x+1}{(x-3)(x+3)} \qquad \left[\because a^2 - b^2 = (a-b)(a+b)\right] \end{aligned}$$

We observe that $f(x)$ is a rational function of x as $\frac{2x+1}{x^2-9}$ is a rational expression.

Clearly, $f(x)$ assumes real values for all x except for all those values of x for which $x^2 - 9 = 0$ i.e., $x = -3, 3$

Hence, $\text{Domain}(f) = R - \{-3, 3\}$.

We have,

$$\begin{aligned} f(x) &= \frac{x^2+2x+1}{x^2-8x+12} \\ &= \frac{x^2+2x+1}{x^2-6x-2x+12} \\ &= \frac{x^2+2x+1}{x(x-6)-2(x-6)} \\ &= \frac{x^2+2x+1}{(x-6)(x-2)} \end{aligned}$$

Clearly, $f(x)$ is a rational function of x as $\frac{x^2+2x+1}{x^2-8x+12}$ is a rational expression in x.

We observe that $f(x)$ assumes real values for all x except for all those values of x for which $x^2 - 8x + 12 = 0$ i.e., $x = 2, 6$

$\therefore$ $\text{Domain}(f) = R - \{2, 6\}$

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