Functions Ex 3.3 Q2

(i) We have,

$$f(x) = \sqrt{x-2}$$

Clearly, $f(x)$ assumes real values, if

$$x - 2 \geq 0$$

$\Rightarrow \quad x \geq 2$

$\Rightarrow \quad x \in [2, \infty)$

Hence, $\text{Domain}(f) = [2, \infty]$

(ii) We have,

$$f(x) = \frac{1}{\sqrt{x^2 - 1}}$$

Clearly, $f(x)$ assumes real values, if

$$x^2 - 1 > 0$$

$\Rightarrow \quad (x-1)(x+1) > 0 \qquad \left[\because a^2 - b^2 = (a-b)(a+b)\right]$

$\Rightarrow \quad x < -1 \text{ or } x > 1$

$\Rightarrow \quad x \in (-\infty, -1) \cup (1, \infty)$

Hence, $\text{domain}(f) = (-\infty, -1) \cup (1, \infty)$

(iii) We have,

$$f(x) = \sqrt{9 - x^2}$$

Clearly, $f(x)$ assumes real values, if

$$9 - x^2 \geq 0$$

$\Rightarrow \quad 9 \geq x^2$

$\Rightarrow \quad x^2 \leq 9$

$\Rightarrow \quad -3 \leq x \leq 3$

$\Rightarrow \quad x \in [-3, 3]$

Hence, $\text{domain}(f) = [-3, 3]$

(iv) We have,

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

Clearly, $f(x)$ assumes real values, if

$$x - 2 \geq 0 \quad \text{and} \quad 3 - x > 0$$

$\Rightarrow \quad x \geq 2 \quad \text{and} \quad 3 > x$

$\Rightarrow \quad x \in [2, 3]$

Hence, $\text{domain}(f) = [2, 3)$.

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