Q1 – 1)

rational: $\{\sqrt{25}, \sqrt{144}, 2.7\overline{6}, 0,9\}$

$\sqrt{25} = 5, \quad \sqrt{144} = 12$

irrational: $\{\sqrt{2}, \frac{3\pi}{2}\}$

Q1 - B - 1

$$4 - 2\left|\frac{5-2x}{2}\right| \leq -8$$

$$-4 \qquad\qquad -4$$

$$-2\left|\frac{5-2x}{2}\right| \leq -12$$

$$-2 \qquad\qquad -2$$

$$\left|\frac{5-2x}{2}\right| \geq 6$$

$$\frac{5-2x}{2} \geq 6 \quad \text{or} \quad \frac{5-2x}{2} \leq -6$$

X2

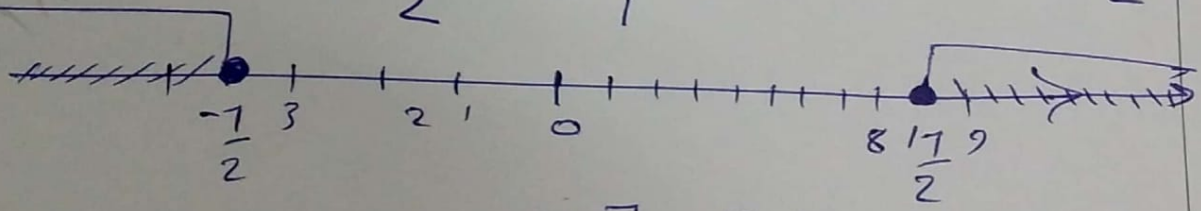
$$5-2x \geq 12 \qquad 5-2x \leq -12$$

$$-5 \qquad -5 \qquad -5 \qquad -5$$

$$-2x \geq 7 \qquad -2x \leq -17$$

$$\frac{-2x}{-2} \geq \frac{7}{-2} \qquad \frac{-2x}{-2} \leq \frac{-17}{-2}$$

$$x \leq \frac{-7}{2} \qquad x \geq \frac{+17}{2}$$



$$S.S = \left(-\infty, \frac{-7}{2}\right] \cup \left[\frac{17}{2}, \infty\right)$$

Q1 - B-2

$$0 < |2x-3| < 6$$

$|2x-3| < 6$ and $|2x-3| > 0$

$-6 < 2x-3 < 6$

$+3 \quad +3 \quad +3$

$-3 < 2x < 9$

$\frac{-3}{2} < \frac{2x}{2} < \frac{9}{2}$

$-\frac{3}{2} < x < \frac{9}{2}$

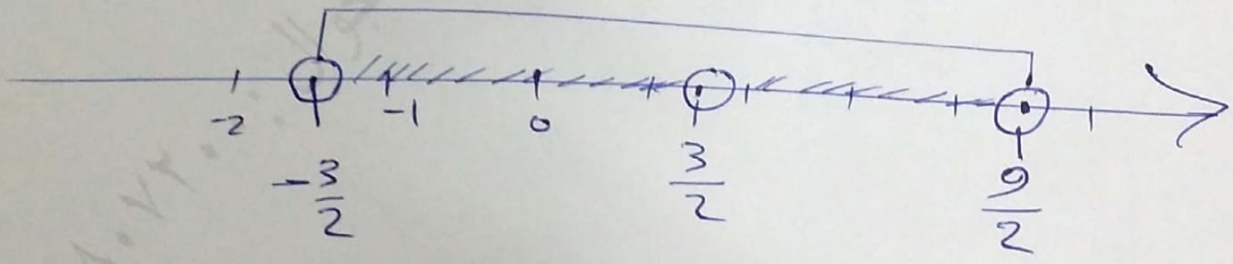
$2x-3=0$

$2x=3$

$\frac{2}{2}x=\frac{3}{2}$

$x=\frac{3}{2}$

$(-\frac{3}{2}, \frac{9}{2})$



55: $(-\frac{3}{2}, \frac{3}{2}) \cup (\frac{3}{2}, \frac{9}{2})$

الأستاذ : ياسر مدرس رياضيات وإحصاء جامعي جوال :0551807200

Q1 - B - 3 -

$$x^3 - 3x^2 \leq 4x$$

$$x^3 - 3x^2 - 4x \leq 0$$

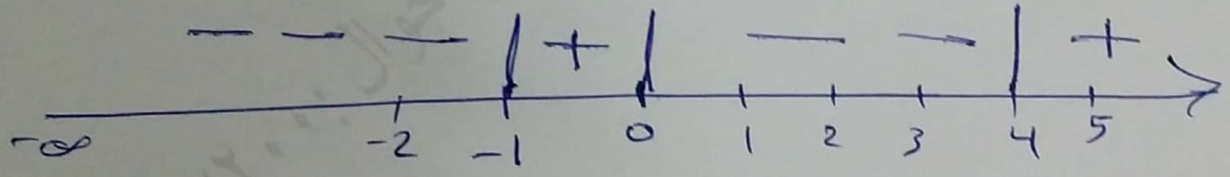
$$x(x^2 - 3x - 4) \leq 0$$

$$x(x+1)(x-4) \leq 0$$

$x = 0$

$x + 1 = 0 \longrightarrow x = -1$

$x - 4 = 0 \longrightarrow x = 4$



$$S.S: (-\infty, -1] \cup [0, 4]$$

Q1 - B - 4

$$\left|\frac{x}{x-5}\right| > 0$$

$$\frac{x}{x-5} = 0 \longrightarrow x = 0$$

$$x - 5 = 0 \longrightarrow x = 5$$

$$SS : R - \{0, 5\}$$

$$= (-\infty, 0) \cup (0, 5) \cup (5, \infty)$$

Q1 - B - 51

$$\frac{3}{x-2} < \frac{5}{x-6}$$

$$\frac{3}{x-2} - \frac{5}{x-6} < 0$$

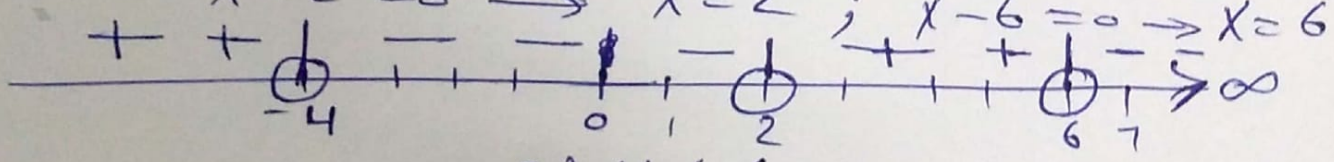
$$\frac{3(x-6) - 5(x-2)}{(x-2)(x-6)} < 0$$

$$\frac{3x-18-5x+10}{(x-2)(x-6)} < 0$$

$$\frac{-2x-8}{(x-2)(x-6)} < 0$$

$-2x-8=0 \rightarrow -2x=8 \rightarrow x=-4$

$x-2=0 \rightarrow x=2$; $x-6=0 \rightarrow x=6$



S.S: $(-4, 2) \cup (6, \infty)$

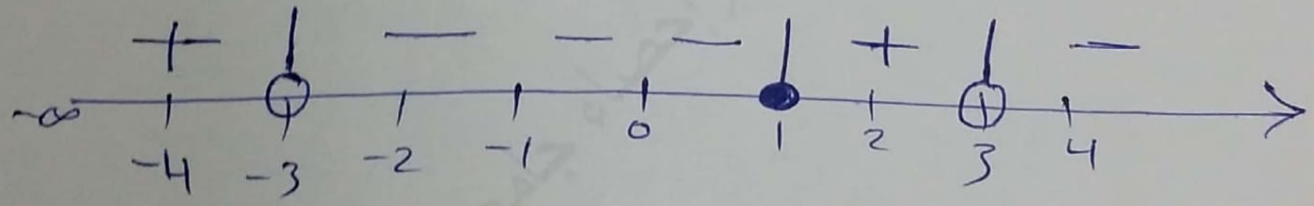
Q: 1 - B - 6

$$\frac{1-x}{\sqrt{x^2}-3} \geq 0$$

$1-x=0 \rightarrow x=1$

$\sqrt{x^2}-3=0 \rightarrow |x|=3$

$\rightarrow \& \; x=\mp 3$



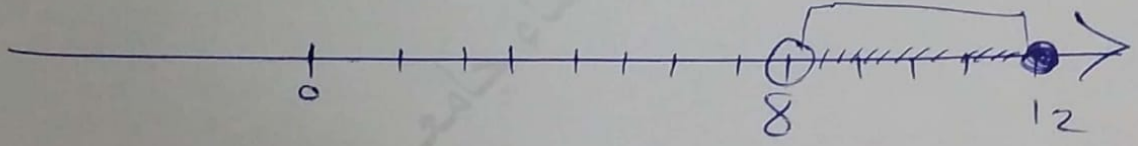
$S.S : (-\infty, -3) \cup [1, 3)$

Q1 : B - 7 :

$$x+3 < 2x-5 \leq x+7$$
$$-x \qquad -x \qquad -x$$

$$3 < x-5 \leq 7$$
$$+5 \qquad +5 \qquad +5$$

$$8 < x \leq 12$$



$$S.S = (8, 12]$$

Q 2 : 1]

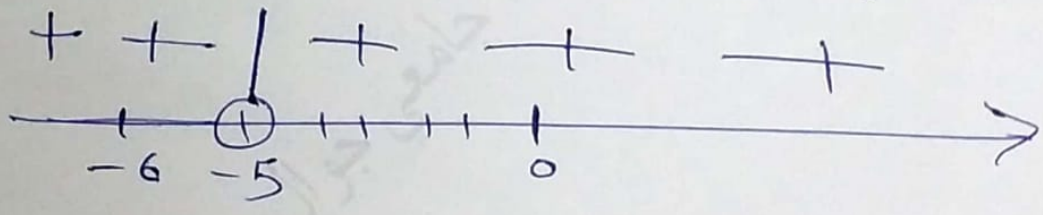
$$f(x) = \frac{3x^2+1}{\sqrt{x^2+10x+25}}$$

The domain $3x^2+1$ is R

$$x^2+10x+25 > 0$$

$$(x+5)(x+5) > 0$$

$$x+5 = 0 \rightarrow x = -5$$



~~The domain~~

$$D_f : R - \{-5\}$$

$$= (-\infty, -5) \cup (-5, \infty)$$

Q_2 : [2]

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

The domain: $1+x$ is $\mathbb{R}$

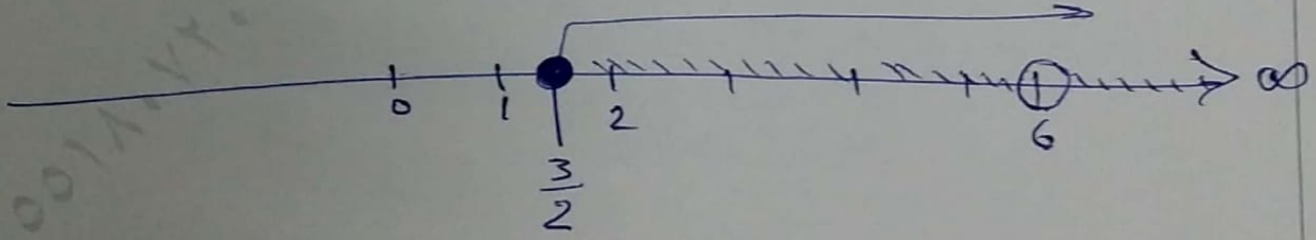
$$2x-3 \geq 0 \rightarrow \frac{2}{2}x \geq \frac{3}{2}$$

$$x \geq \frac{3}{2}$$

$$\sqrt{2x-3}-3 = 0 \rightarrow \sqrt{2x-3} = 3$$

$$2x-3 = 9 \rightarrow \frac{2x}{2} = \frac{12}{2}$$
$$+3 \quad +3$$

$$x = 6$$



$$D_f : [\tfrac{3}{2}, 6) \cup (6, \infty)$$

Q_2 : (3)

$$f(x) = \frac{1-2x}{x^2+16}$$

$D_f : \mathbb{R}$

Q3: 1)

$$f(x)=\frac{x-1}{\sqrt{x}+1} \quad , \quad g(x)=\sqrt{x}-1$$

$x \geq 0$

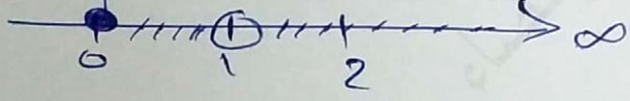
$\sqrt{x}+1=0 \rightarrow$

$\sqrt{x}=-1$

$x=1$

$x \geq 0$

$D_g=[0,\infty)$



$D_f : [0,1) \cup (1,\infty)$

$D_f \neq D_g$

$f(x) \neq g(x)$

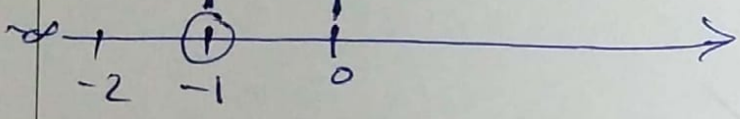
f and g are not Same

Q3 : 2)

$$S(x) = \sqrt{\frac{x}{x+1}} \quad \text{and} \quad t(x) = \frac{\sqrt{x}}{\sqrt{x+1}}$$

$$\frac{x}{x+1} \geq 0$$

$x+1 = 0 \rightarrow x = -1$

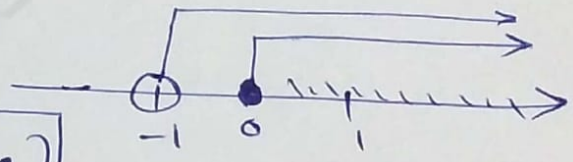


$$D_S : (-\infty, -1) \cup [0, \infty)$$

$$x \geq 0$$

$$x+1 > 0$$

$$x > -1$$



$$D_t = [0, \infty)$$

$$D_S \neq D_t$$

$$S(x) \neq t(x)$$

S and t are not the same

Q 3 : B.

$$f(x) = \frac{3}{x+4} \quad , \quad g(x) = \frac{x+3}{x-2}$$

$$x+4=0 \rightarrow x=-4$$

$$D_f = R - \{-4\}$$

$$D_g = R - \{2\}$$

Zero g(x) : $g(x)=0$

$$x+3=0 \rightarrow x=-3$$

$$D_{\frac{f}{g}} = D_f \cap D_g - \text{Zero } g$$

$$= R - \{-4, 2, -3\}$$

Q 4: 2) $f(x) = \frac{-2}{3-2x}$

y - intercept $\longrightarrow x = 0 \longrightarrow$

$f(0) = \frac{-2}{3} \rightarrow (0, -\frac{2}{3})$

y-intercept $y = \frac{-2}{3}$

X- intercept $y = 0 \longrightarrow$

$\frac{-2}{3-2x} = 0 \rightarrow -2 = 0$

Erron

Then No X-intercepts.

Q 4 : 3) $f(x) = \frac{-2}{3-2x}$

Let: $f(x_1) = f(x_2)$

$$\frac{-2}{3-2x_1} = \frac{-2}{3-2x_2}$$

$\times -2$ $\quad \frac{3-2x_1}{-2} = \frac{3-2x_2}{-2}$

$$3-2x_1 = 3-2x_2$$

$-3 \qquad -3$

$$-2x_1 = -2x_2$$

$\frac{}{-2} \qquad \frac{}{-2}$

$$x_1 = x_2$$

Then $f(x)$ one-to-one

Q 4 : 4) $f(x) = \frac{-2}{3-2x}$

f one-to-one Then there is f^{-1}

$$y = \frac{-2}{3-2x}$$

$$\frac{x}{1} = \frac{-2}{3-2y}$$

$$-2 = 3x - 2xy$$

$$\frac{2xy}{2x} = \frac{3x+2}{2x} \qquad x \neq 0$$

$$y = \frac{3x+2}{2x}$$

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

$$R_f = D_{f^{-1}} = R - \{0\}$$

$Q_5 \rightarrow A: f(x) = \sqrt{4-x^2}$, $g(x) = \sqrt{x-1}$

$f_{og}(x) = f(g(x)) = f(\sqrt{x-1})$

$= \sqrt{4-(\sqrt{x-1})^2}$

$= \sqrt{4-(x-1)} = \sqrt{4-x+1}$

$f_{og} = \sqrt{5-x}$

$D_g : x-1 \geq 0 \rightarrow x \geq 1$

$D_g : [1, \infty)$

$D_{result} : 5-x \geq 0 \rightarrow 5 \geq x \rightarrow x \leq 5$

$= (-\infty, 5]$

$D_{fog} : [1, \infty) \cap (-\infty, 5] =$

$D_{fog} = [1, 5]$

Q 5 - B

$f : \text{even} \longrightarrow f(-x) = f(x)$

$g : \text{odd} \longrightarrow g(-x) = -g(x)$

$$h(x) = \frac{f \circ g(x)}{|x|+2}$$

$$h(-x) = \frac{f \circ g(-x)}{|-x|+2}$$

$$= \frac{f(g(-x))}{|x|+2} =$$

$$= \frac{f(-g(x))}{|x|+2} = \frac{f(g(x))}{|x|+2}$$

$$= \frac{f \circ g(x)}{|x|+2} = h(x)$$

even h

Qu1 1) $f(x)=\frac{-2}{3-2x}$; $D_f = R-\{\frac{3}{2}\}$

let $x_1 < x_2$ $\quad X-2$

$-2x_1 > -2x_2$ $\quad +3$

$\frac{3-2x_1}{1} > \frac{3-2x_2}{1}$

$\frac{1}{3-2x_1} < \frac{1}{3-2x_2}$ $\quad X-2$

$\frac{-2}{3-2x_1} > \frac{-2}{3-2x_2}$

$f(x_1) > f(x_2)$

Then f decreasing on its domain

So f(x) monotonic