Assignment #1 Solution

Question No. 1

Find the solution of inequality and show answer in interval notation

i) $\frac{6-x}{4} \leq \frac{3x-4}{2}$

ii) $\left|\frac{3}{2}z-1\right| \leq 2$

iii) $\left|\frac{3p}{5}-1\right| > \frac{2}{5}$

iv) $x^2-5x+6 \geq 0$

Solution

QUESTION #01:

Q1) (i)

$$\frac{6-x}{4} \leq \frac{3x-4}{2}$$

$$6-x \leq 6x-8$$

$$7x \geq 14$$

$$x \geq 2$$

$0 \quad 1 \quad 2 \quad \infty$ $\quad x \in [2, \infty)$

ii)

$$\left|\frac{3}{2}z-1\right| \leq 2$$

$$\frac{3}{2}z-1 \leq 2 \qquad\qquad \frac{3}{2}z-1 \geq -2$$

$$3z \leq 6 \qquad\qquad z \geq -\frac{2}{3}$$

$$z \leq 2$$

$-\infty \quad -\frac{2}{3} \quad 0 \quad 1 \quad 2 \quad \infty$

$$z \in [-2/3, 2]$$

(iii)

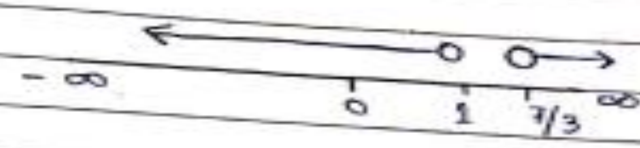
$$\left|\frac{3p}{5}-1\right| > \frac{2}{5}$$

$$\frac{3p-1}{5} > \frac{2}{5} \qquad\qquad \frac{3p-1}{5} < -\frac{2}{5}$$

$$3p-5 > 2 \qquad\qquad 3p-5 < -2$$

$$3p > 7 \qquad\qquad p < 3/3$$

$$p > 7/3 \qquad\qquad p < 1$$



$P \in (-\infty, 1) \cup (7/3, \infty)$

(iv) $x^2 - 5x + 6 \geq 0$.

$x^2 - 3x - 2x + 6 \geq 0$

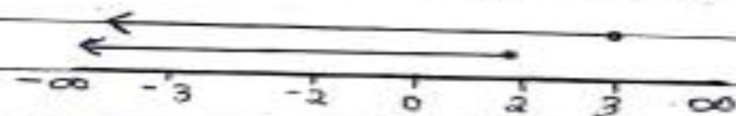
$x(x-3) - 2(x-3) \geq 0$

$(x-2)(x-3) \geq 0$.

CASE - 1 :

$(x-2) \geq 0$ $\quad$ $(x-3) \geq 0$

$x \geq 2$ $\quad$ $x \geq 3$



$x \in (-\infty, 2]$

$x \in (-\infty, 2] \cup [3, \infty)$

Question No. 2

Find an equation for line described

- **i)** Passes through $(-1,3)$ with slope -2
- **ii)** The vertical line passes through (-1.4)
- **iii)** The horizontal line $(-5,4)$

Q2) i) Passes through $(-1, 3)$ with slope -2

Point slope form.

$y - y_1 = m(x - x_1)$

$y - 3 = -2(x+1)$

$y - 3 = -2x - 2$

$y = -2x + 1$

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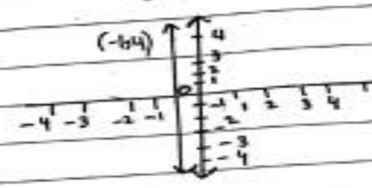
(ii) The vertical line passes through $(-1, 4)$

Point Slope form:

$y - y_1 = m(x - x_1)$

$y - 4 = \frac{1}{0}(x + 1)$

$x = -1$.



(iii) The horizontal line $(-5, 4)$

Point Slope form

$y - y_1 = m(x - x_1)$

$y - 4 = 0(x + 5)$

$y = 4$.

Question No. 3

A particle starts at $A(-2,3)$ and its coordinate change by increments $\Delta x = 5, \Delta y = 0 - 6$. Find its new position.

Q.3) A Particle starts at $A(-2,3)$ and its co-ordinate change by increments $Dx = 5$ $Dy = -6$, Find its new position.

$\Delta x = x_2 - x_1$

$x_2 = Dx + x_1$

$x_2 = 3$

$\Delta y = y_2 - y_1$

$y_2 = \Delta y + y_1$

$y_2 = -3$

New position $(3, -3)$

Question No. 4

Identifying the domain and range of the following functions

i) $f(x) = \sqrt{-(16 - x^2)}$

ii) $g(x) = \frac{1}{\sqrt{x^2}}$

Consider $h(x) = \sqrt{4 - \sqrt{x}}$ can < 0 ? Can$\sqrt{x} > 4$? Find the domain of $h(x)$

QUESTION #04: Identify Domain & Range:

(Q4) $f(x) = \sqrt{-(16-x^2)}$

$x^2 - 16 \geq 0$

$(x-4)(x+4) \geq 0$

$x \geq 4 \quad , \quad x \geq -4$

Domain = $[-\infty, -4] \cup [4, \infty]$

Range = $[0, \infty]$

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(ii) $g(x) = \frac{1}{\sqrt{x^2}}$

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

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

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

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

(iii) $h(x) = \sqrt{4-\sqrt{x}}$

$4 - \sqrt{x} \geq 0$

$-\sqrt{x} \geq -4$

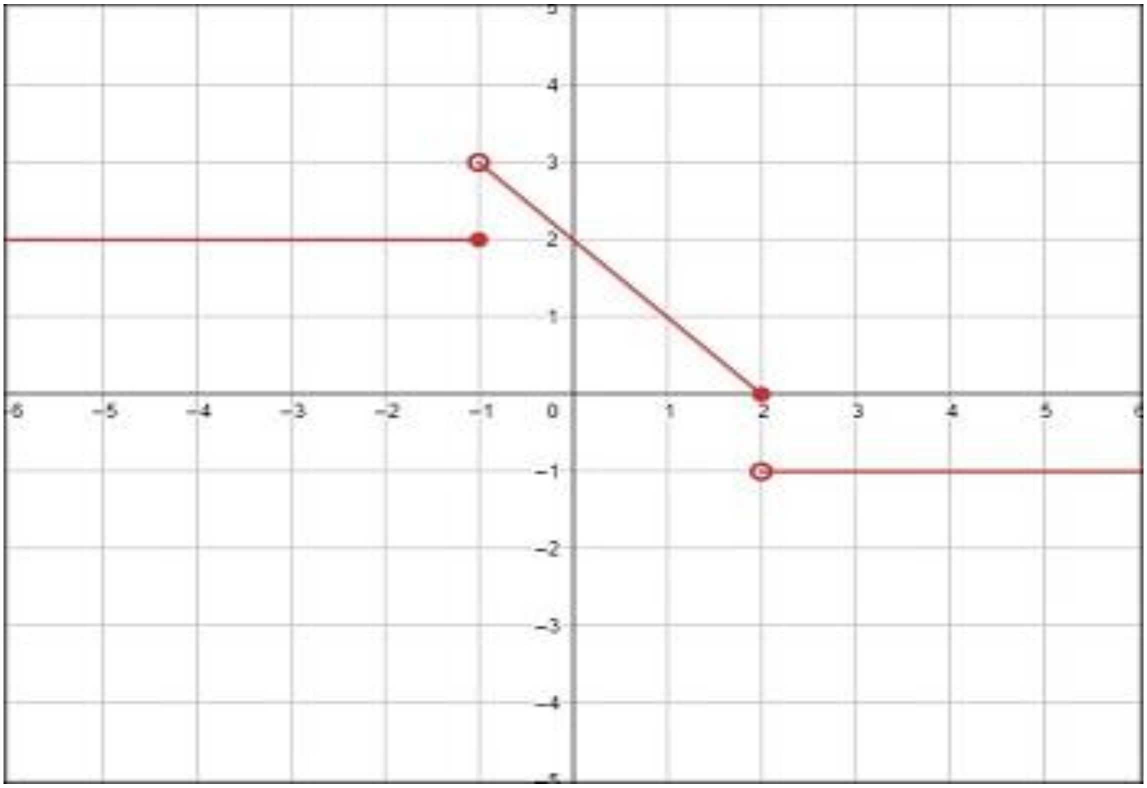
$\sqrt{x} \leq 4$

$x \leq 16$

Domain = $[0, 16]$

Question No. 5

Find a formula in terms of x for the function below.



Solution

Question # 05 :

> First line :

(−6, 2) to (1, 2)

$$\frac{y - y_1}{y_2 - y_1} , \frac{x - x_1}{x_2 - x_1}$$

$$= \frac{y - 2}{2 - 2} = \frac{x + 6}{-1 + 6}$$

$$\frac{y-2}{0} = \frac{x+6}{5}$$

$$y-2 = 0$$

$$y = 2 \qquad \boxed{f(x) = 2}$$

Second line :

$(-1, 3)$ to $(2, 0)$

$$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$$

$$\frac{y-3}{0-3} = \frac{x+1}{2+1}$$

$$\frac{y-3}{\cancel{3}} = \frac{x+1}{\cancel{3}}$$

$$-(y-3) = x+1$$

$$y-3 = -x-1$$

$$y = -x+2$$

$$f(x = x+2$$

Third line :-

$(2, -1)$ to $(6, -1)$

$$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$$

$$\frac{y+1}{-1+1} = \frac{x-2}{6-2}$$

$y+1 = 0\left(\frac{x-2}{4}\right)$

$y+1=0$

$y=-1$

$f(x) = -1 \quad x > 2$

hence the equation will be

$$f(x) = \begin{cases} 2 & x \le -1 \\ -x+2 & -1 < x \le 2 \\ -1 & x > 2 \end{cases}$$