Assignment - 1

Date 17-10-22

Name : Abdullah

Course code : GSC-110

BSE 1(B)

Enrollment No: 02-131222-099

Subject : Applied Calculus and Analytical Geometry

Question No. 1:-

Solve the inequality and show answer in interval notation.

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

$$(6-x)2 \leq 4(3x-4)$$

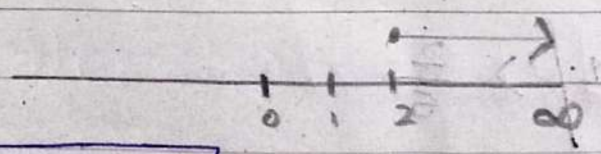
$$12-2x \leq 12x-16$$

$$12+16 \leq 12x+2x$$

$$28 \leq 14x$$

$$\frac{28}{14} \leq x$$

$$2 \leq x \text{ or } \boxed{x \geq 2}$$



$$\boxed{x \in (2, \infty)}$$

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

$-2 \le \frac{3}{2}z - 1 \le 2$

$-2 \le \frac{3}{2}z - 1$

$-2 + 1 \le \frac{3}{2}z$

$-1 \le \frac{3}{2}z$

$\frac{-2}{3} \le z$

or $\boxed{z \ge -\frac{2}{3}}$

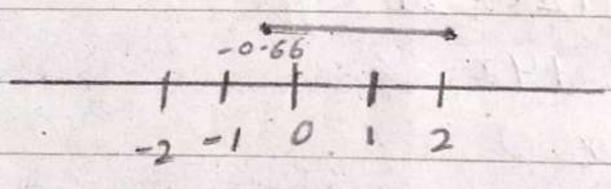
$\frac{3}{2}z - 1 \le 2$

$\frac{3}{2}z \le 2 + 1$

$\frac{\cancel{3}}{2}z \le \cancel{3}$

$\boxed{z \le 2}$

$-\frac{2}{3} \le z \le 2$



$z \in \left(-\frac{2}{3}, 2\right)$

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

$\cancel{\frac{3p}{5} - 1 >}$

$$\frac{3P}{5} - 1 > \frac{2}{5} ,$$

$$\frac{3P-5}{\cancel{5}} > \frac{2}{\cancel{5}}$$

$$3P > 2+5$$

$$3P > 7$$

$$\boxed{P > \frac{7}{3}}$$

$$\frac{3P}{5} - 1 < -\frac{2}{5}$$

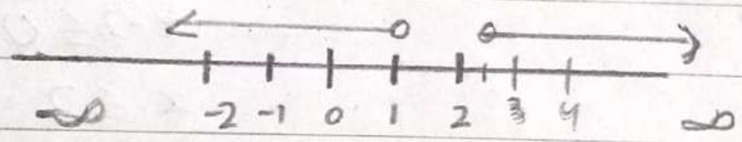
$$\frac{3P-5}{\cancel{5}} < \frac{-2}{\cancel{5}}$$

$$3P < -2+5$$

$$3P < 3$$

$$\boxed{P < 1}$$

$$\frac{7}{3} < P < 1$$



$$\boxed{P \in (-\infty, 1) \cup \left(\frac{7}{3}, \infty\right)}$$

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

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

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

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

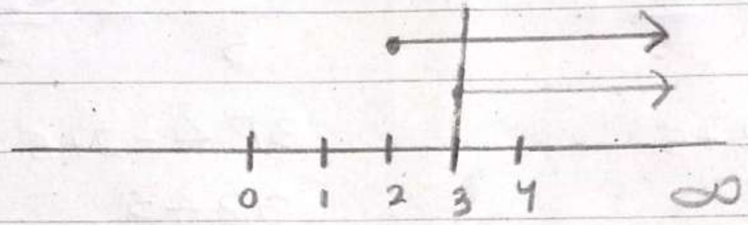
Case 1

$x-3 \geq 0$

$x \geq 3$

$x-2 \geq 0$

$x \geq 2$



$x \in [3, \infty)$

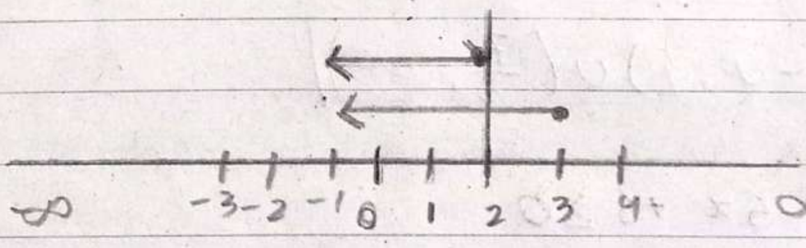
Case - 2

$x-3 \leq 0$

$x \leq 3$

$x-2 \leq 0$

$x \leq 2$



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

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

Question NO. 2:

write an equation for line described

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

Here,

$m = -2$

$x_1 = -1$

$y_1 = 3$

Using slope point formula.

$$y - y_1 = m(x - x_1)$$
$$y - 3 = -2(x - (-1))$$
$$y - 3 = -2(x + 1)$$
$$y - 3 = -2x - 2$$
$$\cancel{2x}\ y = -2x - 2 + 3$$
$$y = -2x + 1$$
$$\boxed{y = 1 - 2x}$$

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

All points of this vertical line passing through $(-1,4)$ have the same x coordinate $\underline{-1}$

$x = -1$

The ealuation passing through $(-1, 4)$ it's only true when the value of x coordinate is -1 for any valye of "y".

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

$m = 0$ (for horizontal line)

$x_1 = -5$

$y_1 = 4$

$$y - y_1 = m(x - x_1)$$
$$y - 4 = 0(x - (-5))$$
$$y - 4 = 0$$
$$\boxed{y = 4}$$

Question NO 3:-

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

Let $A(-2, 3)$ be the starting poind and $B(x_2, y_2)$ be the New point.

we have

$x_1 = -2$, $y_1 = 3$

$\Delta x = 5$, $\Delta y = -6$

$x_2 = ?$, $y_2 = ?$

$\Delta x = x_2 - x_1$	$\Delta y = y_2 - y_1$
$5 = x_2 - (-2)$	$-6 = y_2 - 3$
$5 = x_2 + 2$	$-6 + 3 = y_2$
$5 - 2 = x_2$	$\boxed{y_2 = -3}$
$\boxed{x_2 = 3}$	

$\boxed{\text{New point} \quad B(3, -3)}$

Question No 4:-

Identifying the domain and range of the following functions:-

functions	Domain	Range.
i) $f(x) = \sqrt{-(16 - x^2)}$	$(-\infty, -4] \cup [4, \infty)$	$[0, \infty)$
ii) $g(x) = \frac{1}{\sqrt{x^2}}$	$(-\infty, 0) \cup (0, \infty)$	$(-\infty, 0) \cup (0, \infty)$

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

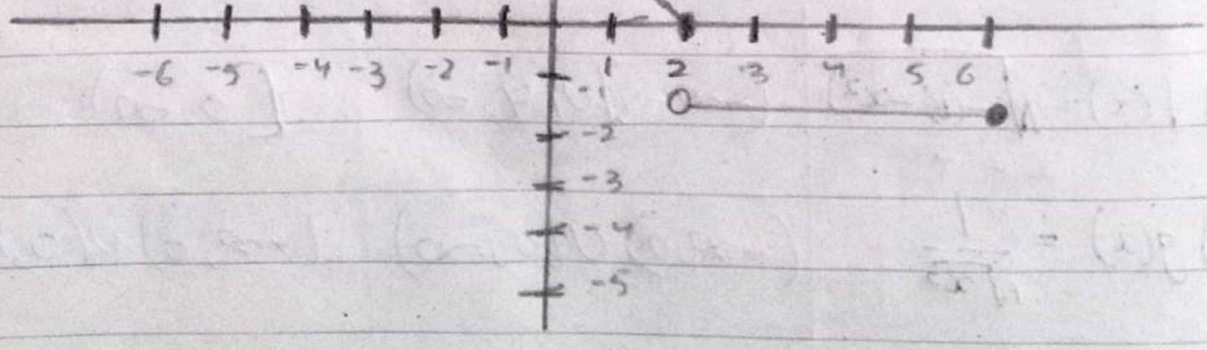
The x can't be less then 0 because $\sqrt{-ve}$ is not defined. i.e $\sqrt{-x}$ is undefined.

The $\sqrt{x}$ can't be greater then 4 because $\sqrt{-ve}$ is undefined.

Domain of $h(x)$ $[0, 16]$

Question NO 5:-

find a formula in term of x for the given function



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

Then

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

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

$\overset{x_1\ y_1}{(-6,2)}$ to $\overset{x_2\ y_2}{(-1,2)}$

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

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

$$(y-2) = \frac{(x+6)\,0}{-1+6}$$

$(y-2)\,5 = 0$

$5y-10=0$

$5y=10$

$\boxed{y=2}$

$\overset{x_1\ y_1}{(-1,3)}$ to $\overset{x_2\ y_2}{(\cancel{0}\,2,0)}$

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

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

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

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

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

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

$$\boxed{y = 2-x}$$

$(\overset{x_1}{2}, \overset{y_1}{-1})$ to $(\overset{x_2}{6}, \overset{y_2}{-1})$

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

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

$$\frac{y+1}{-1+1} = \frac{x-2}{4}$$

$$(y+1)4 = (x-2)0$$

$$4y + 4 = 0$$

$$\cancel{4}y = -\cancel{4}$$

$$\boxed{y = -1}$$

$$f(x) = \begin{cases} 2 & -6 \leq x \leq -1 \\ 2-x & -1 < x \leq 2 \\ -1 & 2 < x \leq 6 \end{cases}$$