Date: 9/10/22

Assignment #1

Name:- Khizar Ali

Roll No:- 22P-9269

Program:- BS(AI)

Semester:- Fall-2022

Course:- MT1003-Calculus & Analytical Geometry.

Date: 9/10/22

Q:1 Solve the inequalities and show the solution sets on real line:-

a) $3(2-x) > 2(3+x)$

Sol : $3(2-x) > 2(3+x)$

$6 - 3x > 6 + 2x$

Subtracting $2x$ on b/s.

$6 - 3x - 2x > 6 + 2x - 2x$

$6 - 5x > 6$

subtracting 6 on b/s

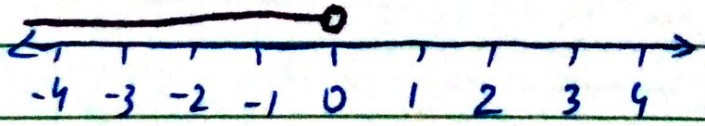
$6 - 5x - 6 > 6 - 6$

$-5x > 0$

dividing -5 on b/s.

$x < 0$

S.S : $(-\infty, 0)$



Date: 9/10/22

b) $\frac{-x+5}{2} \leq \frac{12+3x}{4}$

Sol $\frac{-x+5}{2} \leq \frac{12+3x}{4}$

$= 4(-x+5) \leq 2(12+3x)$

$= -4x+20 \leq 24+6x$

Subtract $6x$ on b/s.

$= -4x-6x+20 \leq 24+6x-6x$

$\Rightarrow -10x+20 \leq 24$

Subtract 20 on b/s.

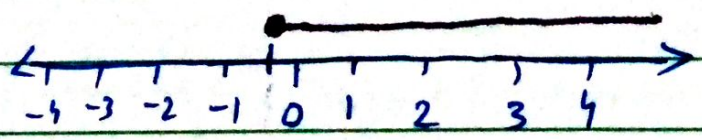
$\Rightarrow -10x+20-20 \leq 24-20$

$\Rightarrow -10x \leq 4$

Dividing by -10 on b/s.

$\Rightarrow x \geq 4/-10 \Rightarrow x \geq -0.4$

S.S $[-0.4, \infty)$



Date:

Q:-2 Express the solution sets as interval or Union of interval and show on Number line.

a) $4 < x^2$

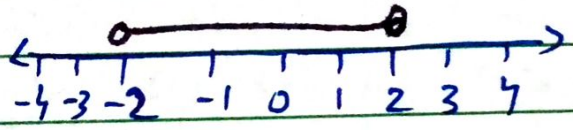
Sol

$= 4 < x^2$

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

$-2 < x < 2$

S.S $(-2, 2)$



b) $4 < x^2 < 9$

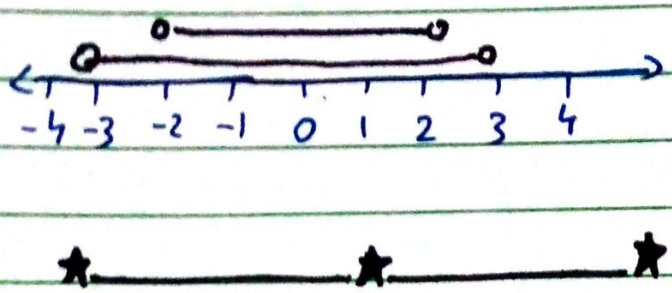
Sol $4 < x^2$, $x^2 < 9$

$-\sqrt{4} < \sqrt{x^2} < \sqrt{4}$, $-\sqrt{9} < x < \sqrt{9}$

$-2 < x < 2$, $-3 < x < 3$

Date: 9/10/22

5.5 $(-2, 2) \cup (-3, 3)$



Q:3 It is estimated that the annual cost of driving a certain new car is given by formula.

$$c = 0.35m + 2200$$

where m represent number of miles driven per year and c is cost in dollars. Jane has purchased such a car and decided to budget b/w ₦6400 and $7100 for next years driving costs. what is corresponding range of miles that she can drive her new car.

Sol

$$6400 < c \leq 7100$$

$$\therefore c = 0.35m + 2200$$

$$6400 < 0.35m + 2200 < 7100$$

subtract 2200 on b/s

$$6400 - 2200 < 0.35m + 2200 - 2200 < 7100 - 2200$$

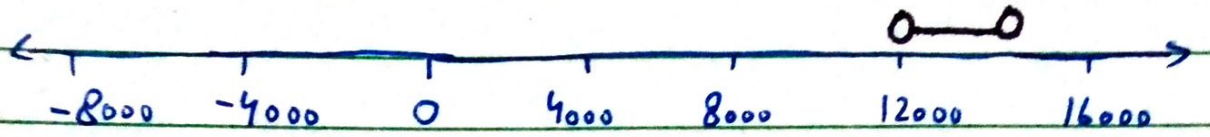
$$4200 < 0.35m < 4900$$

Date: 9/10/22

Divide all parts by 0.35

$$\frac{4200}{0.35} < \frac{0.35m}{0.35} < \frac{4900}{0.35}$$

$$12000 < m < 14{,}000$$



Q:4 a) Solve the quadratic inequalties

$$4x^2 + x + 1 > 0$$

Sol

$$4x^2 + x + 1 > 0$$

$a = 4 \quad b = 1 \quad c = 1$

By using quadratic Formula.

$$= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$= \frac{-1 \pm \sqrt{1-16}}{8} \Rightarrow \frac{-1 \pm \sqrt{-15}}{8}$$

Date: 9/10/22

$\sqrt{-15}$ is equal to $\sqrt{15}i$
it is a complex numbe so

Solution set = All real numbers.

b) Solve $|3x+2| \geq 4$

Sol $|3x+2| \geq 4$

we know $|x| > a \iff -a < x < a$

$-4 \leq 3x+2 \geq 4$

$-4 \leq 3x+2$, $3x+2 \geq 4$.

Subtrat 2 on b/s

$-2-4 \leq 3x+2-2$, $3x+2-2 \geq 4-2$.

$-6 \leq 3x$, $3x \geq 2$.

Divide by 3 on b/s.

$-2 \leq x$, $x \geq 2/3$

$S.S = [-\infty, -2] \cup [2/3, \infty)$