Exercise 7.3

1. Solve the following inequalities.

(i) $3x + 1 < 5x - 4$

$3x - 5x < -4 - 1$

$-2x < -5$

dividing by -2

$x > \frac{5}{2}$

S.S = $\left\{x | x > \frac{5}{2}\right\}$

(ii) $4x - 10.3 \leq 21x - 1.8$

$4x - 21x \leq -1.8 + 10.3$

$-17x \leq 8.5$

dividing by -17

$x \geq \frac{8.5}{-17}$

$x \geq -0.5$

S.S = $\{x | x \geq -0.5\}$

(iii) $4 - \frac{1}{2}x \geq -7 + \frac{1}{4}x$

Multiplying by 4

$16 - 2x \geq -28 + x$

$-2x - x \geq -28 - 16$

$-3x \geq -44$

dividing by -3

$x \leq \frac{44}{3}$

S.S = $\left\{x | x \leq \frac{44}{3}\right\}$

(iv) $x - 2(5 - 2x) \geq 6x - 3\frac{1}{2}$

$x - 2(5 - 2x) \geq 6x - \frac{7}{2}$

Multiplying by 2

$2x - 4(5 - 2x) \geq 12x - 7$

$2x - 20 + 8x \geq 12x - 7$

$10x - 20 \geq 12x - 7$

$10x - 12x \geq -7 + 20$

$-2x \geq 13$

dividing by -2

$x \leq \frac{-13}{2}$

S.S = $\left\{x | x \leq \frac{-13}{2}\right\}$

(v) $\frac{3x+2}{9} - \frac{2x+1}{3} > -1$

Multiplying by 9

$3x + 2 - 3(2x + 1) > -9$

$3x + 2 - 6x - 3 > -9$

$-3x - 1 > -9$

$-3x > -8$

dividing by -3

$x < \frac{8}{3}$

S.S = $\left\{x | x < \frac{8}{3}\right\}$

(vi) $3(2x + 1) - 2(2x + 5) < 5(3x - 2)$

$6x + 3 - 4x - 10 < 15x - 10$

$2x - 7 < 15x - 10$

$2x - 15x < -10 + 7$

$-13x < -3$

dividing by -13

$x > \frac{3}{13}$

S.S = $\left\{x | x > \frac{3}{13}\right\}$

(vii) $3(x - 1) - (x - 2) > -2(x + 4)$

$3x - 3 - x + 2 > -2x - 8$

$2x - 1 > -2x - 8$

$2x + 2x > -8 + 1$

$4x > -7$

dividing by 4

$x > \frac{-7}{4}$

S.S = $\left\{x | x > \frac{-7}{4}\right\}$

(viii) $2\frac{2}{3}x + \frac{2}{3}(5x - 4) > -\frac{1}{3}(8x + 7)$

$\frac{8}{3}x + \frac{2}{3}(5x - 4) > -\frac{1}{3}(8x + 7)$

multiplying by 3

$8x + 2(5x - 4) > -1(8x + 7)$

$8x + 10x - 8 > -8x - 7$

$18x - 8 > -8x - 7$

$18x + 8x > 8 - 7$

$26x > 1$

dividing by 26

$x > \frac{1}{26}$

S.S = $\left\{x | x > \frac{1}{26}\right\}$

Q. 2: Solve the following inequalities.

(i) $-4 < 3x + 5 < 8$

Subtracting by -5 on all sides

$-4 - 5 < 3x + 5 - 5 < 8 - 5$

$-9 < 3x < 3$

Dividing by 3

$-3 < x < 1$

S.S = $\{x| -3 < x < 1\}$

(ii) $-5 \leq \frac{4-3x}{2} < 1$

multiplying by 2

$-10 \leq 4-3x < 2$

subtracting by -4

$-10-4 \leq 4-3x-4 < 2-4$

$-14 \leq -3x < -2$

Dividing by -3

$\frac{14}{3} \geq x > \frac{2}{3}$

S.S = $\left\{x| \frac{14}{3} \geq x > \frac{2}{3}\right\}$

(iii) $-6 < \frac{x-2}{4} < 6$

multiplying by 4

$-24 < x-2 < 24$

Adding 2

$-22 < x-2+2 < 26$

$-22 < x < 26$

S.S = $\{x| -22 < x < 26\}$

(iv) $3 \geq \frac{7-x}{2} \geq 1$

multiplying by 2

$6 \geq 7-x \geq 2$

$6-7 \geq 7-x-7 \geq 2-7$

$-1 \geq -x \geq -5$

dividing by -1

$1 \leq x \leq 5$

S.S = $\{x| 1 \leq x \leq 5\}$

(v) $3x-10 \leq 5 < x+3$

$3x-10 \leq 5$ and $5 < x+3$

$3x \leq 5+10$ and $5-3 < x$

$3x \leq 15$ and $2 < x$

$x \leq 5$ and $2 < x$

$5 \geq x > 2$

S.S = $\{x| 5 \geq x > 2\}$

(vi) $-3 \leq \frac{x-4}{-5} < 4$

multiplying by -5

$15 \geq x-4 > -20$

Adding 4

$19 \geq x > -16$

S.S = $\{x|\ -16 < x \leq 19\}$

(vii)

$$1-2x < 5-x \leq 25-6x$$

$$1-2x < 5-x \text{ and } 5-x \leq 25-6x$$

$$-2x+x < 5-1 \text{ and } -x+6x \leq 25-5$$

$$-x < 4 \text{ and } 5x \leq 20$$

$$x > -4 \text{ and } x \leq 4$$

S.S = $\{x|\ 4 \geq x > -4\}$

(viii)

$$3x-2 < 2x+1 < 4x+17$$

$$3x-2 < 2x+1 \text{ and } 2x+1 < 4x+17$$

$$3x-2x < 1+2 \text{ and } 2x-4x < 17-1$$

$$x < 3 \text{ and } -2x < 16$$

$$x < 3 \text{ and } x > -8$$

S.S = $\{x|\ 3 > x > -8\}$