



Linear Inequations Ex 15.1 Q21

$$\frac{3}{x-2} < 1$$

$$\frac{3}{x-2} - 1 < 0$$

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

$$\frac{3 - x + 2}{x-2} < 0$$

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

$$\frac{x-5}{x-2} > 0$$

$$\text{Case 1: } x-5 > 0 \quad \text{and} \quad x-2 > 0$$

$$\Rightarrow x > 5 \quad \text{and} \quad x > 2$$

$$\Rightarrow x > 5$$

$$\text{Case 2: } x-5 < 0 \quad \text{and} \quad x-2 < 0$$

$$\Rightarrow x < 5 \quad \text{and} \quad x < 2$$

$$\Rightarrow x < 2$$

$$\therefore \text{ solution set is } (-\infty, 2) \cup (5, \infty)$$

Linear Inequations Ex 15.1 Q22

$$\frac{1}{x-1} \leq 2$$

$$\frac{1}{x-1} - 2 \leq 0$$

$$\frac{1-2(x-1)}{x-1} \leq 0$$

$$\frac{1-2x+2}{x-1} \leq 0$$

$$\frac{3-2x}{x-1} \leq 0$$

$$\text{Case 1: } 3-2x \geq 0 \quad \text{and} \quad x-1 < 0$$

$$\Rightarrow x \leq \frac{3}{2} \quad \text{and} \quad x < 1$$

$$\Rightarrow x < 1$$

$$\text{Case 2: } 3-2x \leq 0 \quad \text{and} \quad x-1 > 0$$

$$\Rightarrow x \geq \frac{3}{2} \quad \text{and} \quad x > 1$$

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

Hence the solution set is $(-\infty, 1) \cup \left[\frac{3}{2}, \infty\right)$

$$\frac{4x+3}{2x-5} < 6$$

$$\frac{4x+3}{2x-5} - 6 < 0$$

$$\frac{4x+3-6(2x-5)}{2x-5} < 0$$

$$\frac{4x+3-12x+30}{2x-5} < 0$$

$$\frac{-8x+33}{2x-5} < 0$$

$$\frac{8x-33}{2x-5} > 0$$

$$\text{Case 1: } 8x - 33 > 0 \quad \text{and} \quad 2x - 5 > 0$$

$$\Rightarrow x > \frac{33}{8} \quad \text{and} \quad x > \frac{5}{2}$$

$$\Rightarrow x > \frac{33}{8}$$

$$\text{Case 2: } 8x - 33 < 0 \quad \text{and} \quad 2x - 5 < 0$$

$$\Rightarrow x < \frac{33}{8} \quad \text{and} \quad x < \frac{5}{2}$$

$$\Rightarrow x < \frac{5}{2}$$

$$\text{Hence the solution set is } \left(-\infty, \frac{5}{2}\right) \cup \left(\frac{33}{8}, \infty\right)$$

$$\frac{5x - 6}{x + 6} < 1$$

$$\frac{5x - 6}{x + 6} - 1 < 0$$

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

$$\frac{5x - 6 - x - 6}{x + 6} < 0$$

$$\frac{4x - 12}{x + 6} < 0$$

Case 1: $4x - 12 > 0$ and $x + 6 < 0$

$\Rightarrow x > 3$ and $x < -6$

This is not possible.

Case 2: $4x - 12 < 0$ and $x + 6 > 0$

$\Rightarrow x < 3$ and $x > -6$

Hence the solution set is $(-6, 3)$

***** END *****