Linear Inequations Ex 15.3 Q7

We have,

$$\frac{|2x-1|}{x-1}-2>0$$

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

$$\frac{|2x-1|-2x+2}{x-1}>0 \quad \ldots(\text{i})$$

Case I: when $|2x-1|\geq 0$

$$i.e,\ 2x-1\geq 0$$
$$2x\geq 1$$
$$x\geq \frac{1}{2}$$

$\Rightarrow \quad |2x-1|-2x+2>0 \ \text{ and } \ x-1>0$

$\Rightarrow \quad 2x-1-2x+2>0 \ \text{ and } \ x>1$

$\Rightarrow \quad x>1 \quad \ldots(\text{ii})$

Case II: when $|2x-1|<0$

$$i.e,\ 2x-1<0$$
$$2x<1$$
$$x<\frac{1}{2}$$

$\Rightarrow \quad -(2x-1)-2x+2>0 \quad \text{and} \quad x<1$

$\Rightarrow \quad -4+3>0$

$\Rightarrow \quad -x>-\frac{3}{4}$

$\Rightarrow \quad x<\frac{3}{4} \quad \text{and} \ x<1$

$\Rightarrow \quad x\in\left(\frac{3}{4},1\right) \quad \ldots(\text{iii})$

Combining (ii) and (iii) we get $\left(\frac{3}{4},1\right)\cup(1,\infty)$ as the solution set.

Linear Inequations Ex 15.3 Q8

We have,

$$|x-1|+|x-2|+|x-3|-6 \geq 0 \qquad \ldots(\mathrm{i})$$

Case I: $|x-1| \geq 0$

$x \geq 1$

$\Rightarrow \quad x-1-(x-2)-(x-3)-6 \geq 0$

$\Rightarrow \quad -x+4-6 \geq 0$

$\Rightarrow \quad -x \geq 2$

$\Rightarrow \quad x \leq -2$

$\Rightarrow \quad (-\infty,-2] \qquad \ldots(\mathrm{ii})$

Case II: $|x-2| \geq 0$

$x \geq 2$

$\Rightarrow \quad x-1+x-2-(x-3)-6 \geq 0$

$x-6 \geq 0$

$x \geq 6$

$\Rightarrow \quad [6,\infty) \ldots\ldots\ldots\ldots(\mathrm{iii})$

case III: When $|x-3| \geq 0$

$x \geq 3$

$\Rightarrow \quad x-1+x-2+x-3-6 \geq 0$

$\Rightarrow \quad 3x-12 \geq 0$

$\Rightarrow \quad 3x \geq 12$

$\Rightarrow \quad x \geq 4$

$\Rightarrow \quad \therefore\ x \in [4,\infty)$

also

$\Rightarrow \quad |x-1| < 0$

$\Rightarrow \quad x < 1$

$\Rightarrow -(x-1)-(x-2)-(x-3)-6 \geq 0$

$\Rightarrow \quad -3x \geq 0$

$\Rightarrow \quad x \leq 0$

$\Rightarrow \quad |x-2| < 0$

$x < 2$

$\Rightarrow (x-1)-(x-2)-(x-3)-6 \geq 0$

$\Rightarrow x-1-x+2-x+3-6 \geq 0$

$\Rightarrow \quad -x-2 \geq 0$

$\Rightarrow \quad -x \geq 2$

$\Rightarrow \quad x \leq -2$

$\Rightarrow \quad |x-3| < 0$

$\Rightarrow \quad x < 3$

$\Rightarrow (x-1)+(x-2)-(x-3)-6 \geq 0$

$\Rightarrow \quad x-6 \geq 0$

$\Rightarrow \quad x \geq 6$

Combining all cases we get $(-\infty, 0] \cup [4, \infty)$ as the solution set.

*********** END **********