Linear Inequations Ex 15.3 Q9

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

$$\text{Let } y = |x-2|$$

$$\Rightarrow \frac{y-1}{y-2} \leq 0$$

$$\Rightarrow 1 \leq y < 2$$

$$\Rightarrow 1 \leq |x-2| < 2$$

$$\Rightarrow x \in [-2+2, -1+2] \cup [1+2, 2+2]$$

$$\Rightarrow x \in [0,1] \cup [3,4]$$

$$\text{The solution set is } [0,1] \cup [3,4].$$

Linear Inequations Ex 15.3 Q10

$$\frac{1}{|x|-3} \le \frac{1}{2}$$

$$\Rightarrow \frac{1}{|x|-3} - \frac{1}{2} \le 0$$

$$\Rightarrow \frac{2-|x|+3}{2(|x|-3)} \le 0$$

$$\Rightarrow \frac{5-|x|}{2(|x|-3)} \le 0$$

$$\Rightarrow \frac{|x|-5}{2(|x|-3)} \ge 0$$

$$\Rightarrow \frac{|x|-5}{|x|-3} \ge 0$$

$$\Rightarrow |x| \ge 5 \text{ or } |x| < 3$$

$$\Rightarrow x \in (-\infty,-5] \cup [5,\infty) \text{ or } x \in (-3,-3)$$

$$\Rightarrow x \in (-\infty,-5] \cup (-3,-3) \cup [5,\infty)$$

The solution set is $(-\infty,-5] \cup (-3,-3) \cup [5,\infty)$.

Linear Inequations Ex 15.3 Q11

$$|x+1|+|x|>3$$

CASE1: When $-\infty < x < -1$

$|x+1| = -(x+1)$ and $|x| = -x$

$\therefore |x+1|+|x|>3$

$\Rightarrow -(x+1)-x>3$

$\Rightarrow -2x>4$

$\Rightarrow x<-2$

But, $-\infty < x < -1$.

$\therefore$ The solution set of the given inequation is $(-\infty,-2)$.

CASE2: When $-1 \le x < 0$

$|x+1| = (x+1)$ and $|x| = -x$

$\therefore |x+1| + |x| > 3$

$\Rightarrow (x+1) - x > 3$

$\Rightarrow 1 > 3$

Which is not true.

CASE3: When $0 < x < \infty$

$|x+1| = (x+1)$ and $|x| = x$

$\therefore |x+1| + |x| > 3$

$\Rightarrow (x+1) + x > 3$

$\Rightarrow 2x > 2$

$\Rightarrow x > 1$

But, $0 < x < \infty$.

$\therefore$ The solution set of the given inequation is $(1, \infty)$.

Combining Case1, Case2 and Case3,

we obtain that the solution set of given in equality is $(-\infty, -2) \cup (1, \infty)$

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