A

1. $(x-2)^3 + 5x(x-3) \geq x^2(x-1) - 3x$

   $x^3 - 6x^2 + 12x - 8 + 5x^2 - 15x \geq x^3 - x^2 - 3x$

   $-8 \geq 0$

   imp.

2. $\frac{5x}{x+1} + \frac{2}{x-1} \geq \frac{3x-5x^2}{1-x^2}$

   $\frac{5x}{x+1} + \frac{2}{x-1} \geq \frac{-3x+5x^2}{(x-1)(x+1)}$

   $\frac{5x^2 - 5x + 2x + 2 + 3x - 5x^2}{(x-1)(x+1)} \geq 0$

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

   $x < -1 \vee x > 1$

3. $(x^2 - 4x - 12)(3x^2 - 5x + 2) \geq 0$

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

   $x \leq -2 \vee \frac{2}{3} \leq x \leq 1 \vee x \geq 6$

4. $\begin{cases} x^2 - 4x \geq 0 \\ 5(x-4) + (1-x)(1+x) \leq 6 - x^2 \\ \frac{x-1}{x-3} > 0 \end{cases}$

   $\begin{cases} x \leq 0 \vee x \geq 4 \\ 5x - 20 + 1 - x^2 \leq 6 - x^2 \\ x < 1 \vee x > 3 \end{cases}$

   $\begin{cases} x \leq 0 \vee x \geq 4 \\ 5x \leq 25 \\ x < 1 \vee x > 3 \end{cases}$ $\quad$ $\begin{cases} x \leq 0 \vee x \geq 4 \\ x \leq 5 \\ x < 1 \vee x > 3 \end{cases}$

   $x \leq 0 \vee 4 \leq x \leq 5$

5. $|x+2| - |x-3| = 2x + 1$

   $\begin{cases} x < -2 \\ -x - 2 + x - 3 = 2x + 1 \end{cases}$ $\quad$ $\begin{cases} x < -2 \\ x = -3 \end{cases}$

   $x = -3$

   $\begin{cases} -2 \leq x < 3 \\ x + 2 + x - 3 = 2x + 1 \end{cases}$ $\quad$ $\begin{cases} -2 \leq x < 3 \\ -1 = 1 \end{cases}$

   imp.

   $\begin{cases} x \geq 3 \\ x + 2 - x + 3 = 2x + 1 \end{cases}$ $\quad$ $\begin{cases} x \geq 3 \\ x = 2 \end{cases}$

   imp.

6. $|2x + 3| < 7$

$$\begin{cases} 2x + 3 < 7 \\ 2x + 3 > -7 \end{cases} \qquad \begin{cases} 2x < 4 \\ 2x > -10 \end{cases} \qquad -5 < x < 2$$

7. $|4x - 1| \leq 4x$

$$\begin{cases} x \leq \frac{1}{4} \\ -4x + 1 \leq 4x \end{cases} \qquad \begin{cases} x \leq \frac{1}{4} \\ -8x \leq -1 \end{cases} \qquad \begin{cases} x \leq \frac{1}{4} \\ x \geq \frac{1}{8} \end{cases} \qquad \frac{1}{8} \leq x \leq \frac{1}{4}$$

$$\begin{cases} x > \frac{1}{4} \\ 4x - 1 \leq 4x \end{cases} \qquad \begin{cases} x > \frac{1}{4} \\ -1 \leq 0 \end{cases} \qquad x > \frac{1}{4}$$

$$x \geq \frac{1}{8}$$

8. $|x + 2| + |7x - 1| + |1 - 3x| \geq -13$ $\qquad \forall x \in R$