

Work the following inequalities. State your answer in both interval and set notation. Be sure to clearly mark your final answer or full credit will not be given.

1. $x^3 < x$

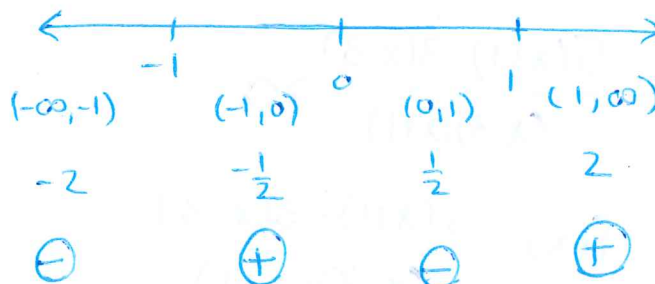
$$x^3 - x < 0$$

$$f(x) = x^3 - x$$

zeros: $0 = x^3 - x$

$$0 = x(x^2 - 1)$$

$$x = 0, x = \pm 1$$



$$\text{Soln: } (-\infty, -1) \cup (0, 1) \\ \{x \mid x < -1, 0 < x < 1\}$$

2. $3(x^2 - 2) < 2(x - 1)^2 + x^2$

$$3x^2 - 6 < 2(x^2 - 2x + 1) + x^2$$

$$3x^2 - 6 < 2x^2 - 4x + 2 + x^2$$

$$-6 < -4x + 2$$

$$-8 < -4x$$

$$2 > x$$

$$\text{Soln: } (-\infty, 2) \\ \{x \mid x < 2\}$$

3. $6x - 5 < \frac{6}{x}$

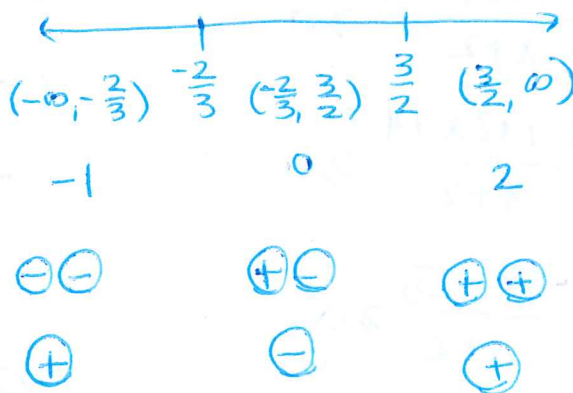
$$6x - 5 - \frac{6}{x} < 0$$

$$6x^2 - 5x - 6 < 0$$

$$(3x + 2)(2x - 3) < 0$$

$$f(x) = (3x + 2)(2x - 3)$$

zeros: $x = -\frac{2}{3}, \frac{3}{2}$



$$\text{Soln: } (-\frac{2}{3}, \frac{3}{2}) \\ \{x \mid -\frac{2}{3} < x < \frac{3}{2}\}$$

$$4. \frac{5}{x-3} > \frac{3}{x+1}$$

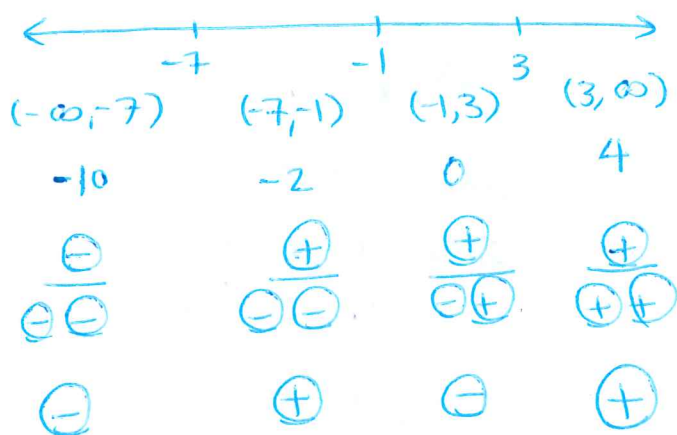
$$\frac{5}{x-3} - \frac{3}{x+1} > 0$$

$$\frac{5(x+1) - 3(x-3)}{(x-3)(x+1)} > 0$$

$$f(x) = \frac{5(x+1) - 3(x-3)}{(x-3)(x+1)}$$

$$\begin{aligned} \text{zeros: } 0 &= 5(x+1) - 3(x-3) \\ &= 5x + 5 - 3x + 9 \\ &= 2x + 14 \\ -7 &= x \end{aligned}$$

asymptotes: $x=3, x=-1$



$$\text{Soln: } (-7, -1) \cup (3, \infty)$$

$$\{x \mid -7 < x < -1, x > 3\}$$

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

$$\frac{x-1}{x+2} \geq -2$$

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

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

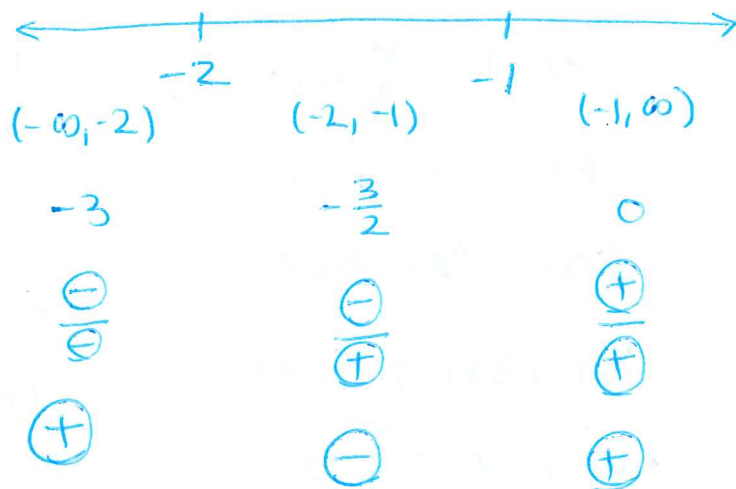
$$\frac{x-1+2x+4}{x+2} \geq 0$$

$$\frac{3x+3}{x+2} \geq 0$$

$$f(x) = \frac{3(x+1)}{x+2}$$

$$\begin{aligned} \text{zeros: } 0 &= 3(x+1) \\ x &= -1 \end{aligned}$$

asymptotes: $x=-2$



$$\text{Soln: } (-\infty, -2) \cup [-1, \infty)$$

$$\{x \mid x < -2, -1 \leq x\}$$