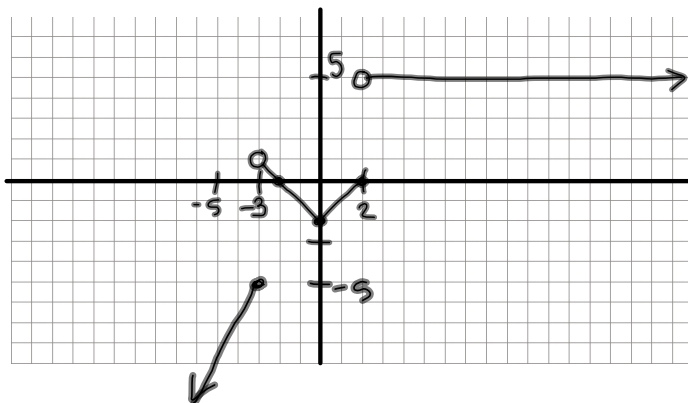


Review:

Graph the piecewise function:

$$f(x) = \begin{cases} 2x+1, & x \leq -3 \\ |x|-2, & -3 < x \leq 2 \\ 5, & x > 2 \end{cases}$$



Given the polynomial $f(x) = 2x^3 + x^2 + 18x + 9$

What does Descartes' Rule of Signs tell us about the number of positive real zeros negative real zeros?

positive real zeros?

none. ($f(x)$ has no sign changes)

negative real zeros?

$$f(-x) = -2x^3 + x^2 - 18x + 9$$

3 or 1 negative real zeros

3.6 Polynomial and Rational Inequalities

Linear: $2x+1 > 5$
 $2x > 4$
 $\{x | x > 2\}$
 $(2, \infty)$

abs. value.

$$|2x+1| > 5$$

$$2x+1 > 5 \quad \text{or} \quad 2x+1 < -5$$

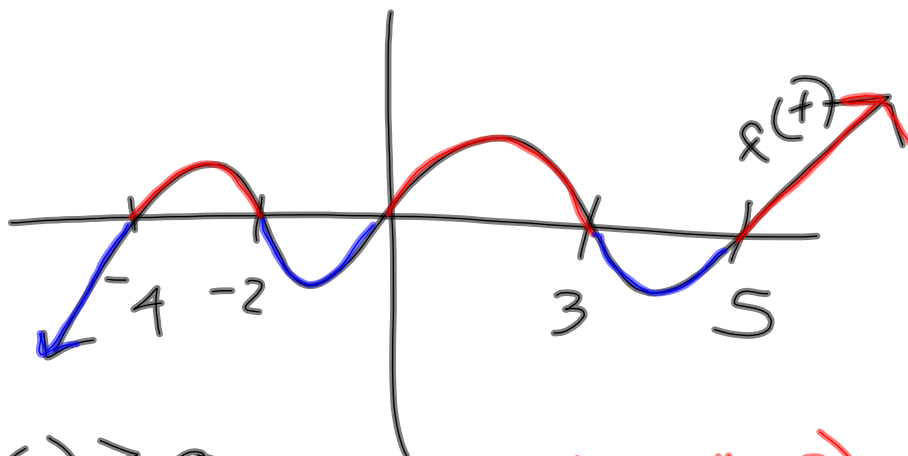
$$2x > 4 \qquad \qquad 2x < -6$$

$$x > 2 \qquad \qquad \qquad x < -3$$

$$\{x | x < -3 \text{ or } x > 2\}$$



$$(-\infty, -3) \cup (2, \infty)$$



$$f(x) \geq 0 \quad (\text{where is } f(x) \text{ positive?})$$

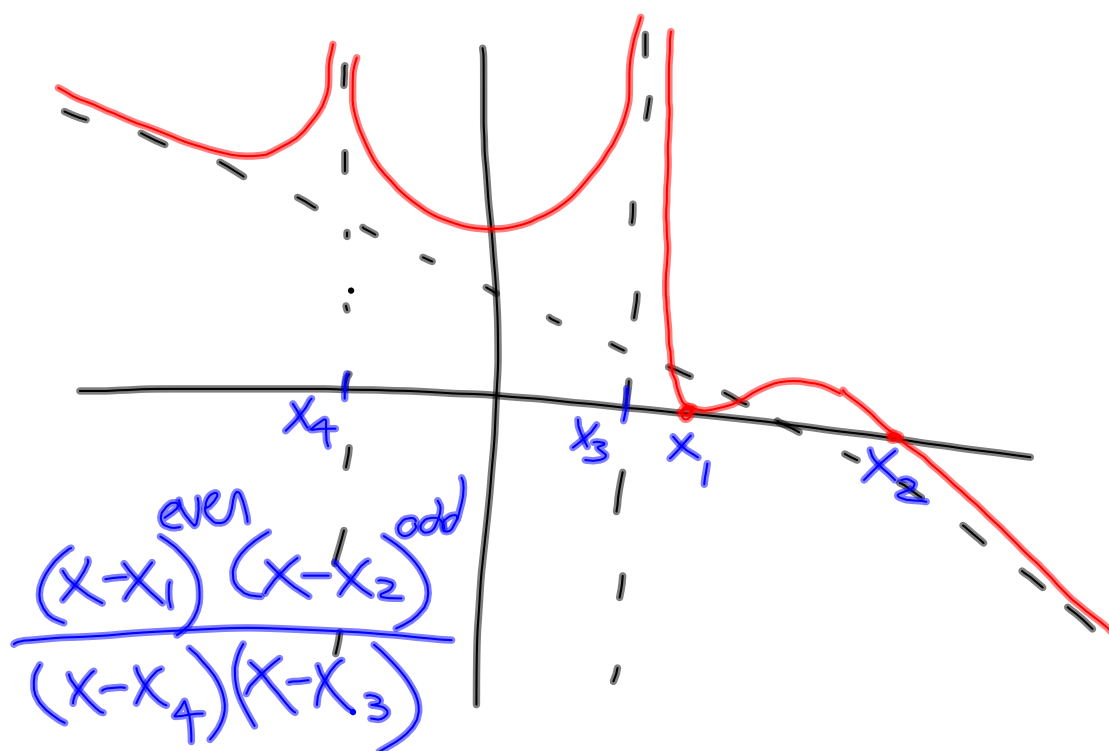
$$[-4, -2] \cup [0, 3] \cup [5, \infty)$$

$$f(x) < 0$$

$$(-\infty, -4) \cup (-2, 0) \cup (3, 5)$$

$$\frac{5x^3 + 7x^2 + 3x - 1}{2x + 4} \geq \frac{3x^2 + 7}{2x^3 - 5x}$$

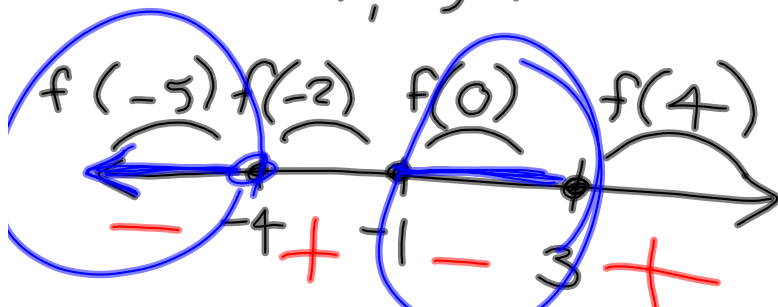
hard to solve algebraically in
compare to 0!



The only x -values @ which the value of $f(x)$ can change from positive to negative (or negative to positive) are @ zeros & vertical asymptotes (but it doesn't have to change)

$$(x+4)(x-3)(x+1) < 0$$

zeros: $-4, 3, -1$



$$(-\infty, -4) \cup (-1, 3)$$

$$x^2 + 6x \geq 7$$

1. rearrange to compare to zero.

$$x^2 + 6x - 7 \geq 0$$

2. factor to find zeros
(or vertical asymptotes)

$$(x+7)(x-1) \geq 0$$

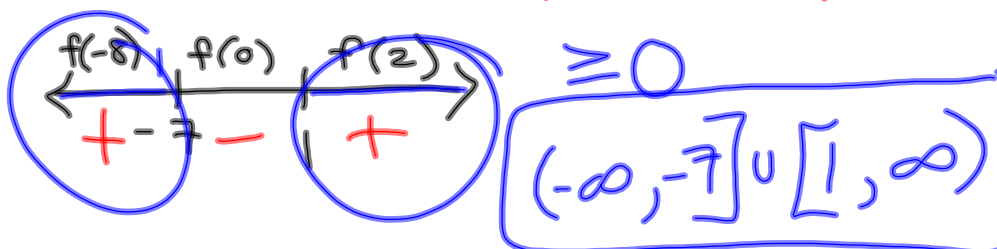
zeros: $-7, 1$

$$0 \geq f(x)$$

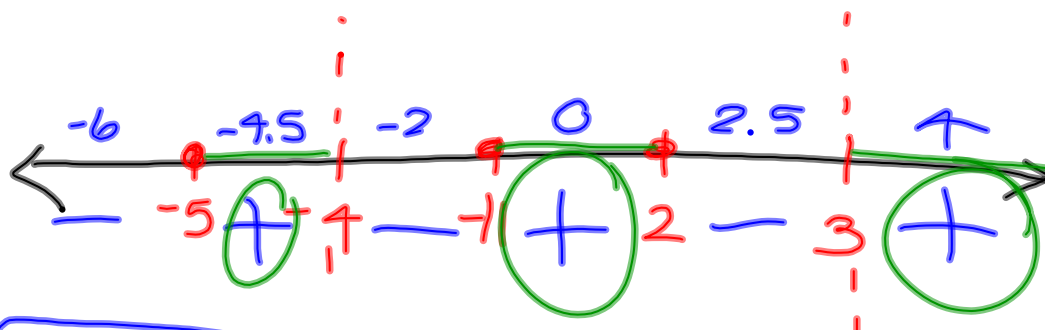
$$\Leftrightarrow$$

$$f(x) \leq 0$$

3. split real number line into intervals according to #'s found in step 2; test a value in each interval for + / -

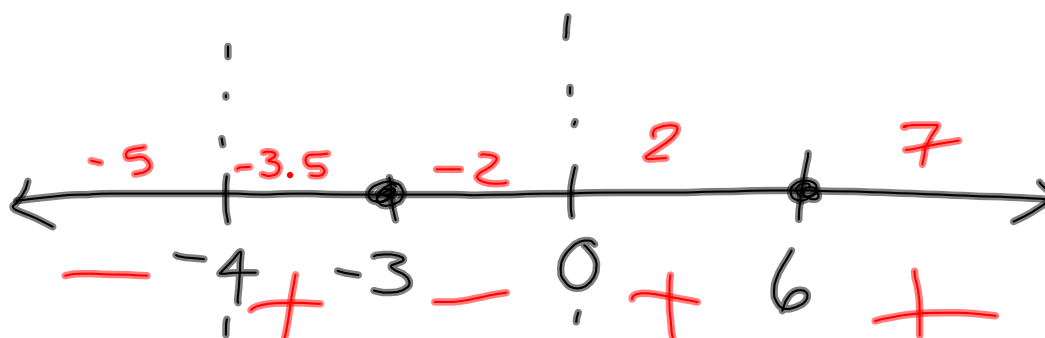


$$\frac{(x+5)(x+1)(x-2)}{(x-3)(x+4)} \geq 0$$



$$[-5, -4) \cup [-1, 2] \cup (3, \infty)$$

$$\frac{(x-6)^2(x+3)}{x(x+4)} \leq 0$$



$$(-\infty, -4) \cup [-3, 0)$$

$$\frac{3.6}{56. \frac{3}{x^2-4} \leq \frac{5}{x^2+7x+10}}$$

$$\frac{x^5}{x^5} \frac{3}{x^2-4} - \frac{5}{x^2+7x+10} \frac{x^2}{x^2} \leq 0$$

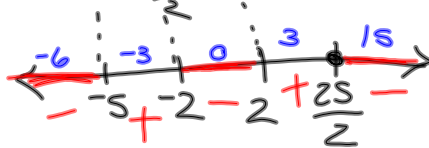
$$\frac{3(x+5)}{(x-2)(x+2)} - \frac{5(x-2)}{(x+2)(x+5)} \leq 0$$

$$\frac{3(x+5) - 5(x-2)}{(x-2)(x+2)(x+5)} \leq 0$$

$$\frac{3x+15-5x+10}{(x-2)(x+2)(x+5)} \leq 0$$

$$\frac{-2x+25}{(x-2)(x+2)(x+5)} \leq 0$$

V.A.: 2, -2, -5
 zero: $-2x+25=0$
 $-2x=-25$
 $x=\frac{25}{2}$



$$(-\infty, -5) \cup (-2, 2) \cup \left[\frac{25}{2}, \infty\right)$$

$$\frac{3.6}{31-39 \text{ odd}}$$

$$47, 53-61 \text{ odd}$$