2.8 Solving Inequalities in One Variable

Obj: 1. Solve ineq. with polynomials & rational fncs algebraically & graphically.

$f(x) = (x+3)(x^2+1)(x-4)^2$

Find the zeros & the values that are positive & negative.

Sign chart: $x+3=0$ $x=-3$

$x^2+1=0$ $x^2=-1$ $x=\pm i$

$x-4=0$ $x=4$

$(-)(+)(-)^2$ $(+)(+)(-)^2$ $(+)(+)(+)^2$

POS

-4 -3 0 4 5

neg. pos

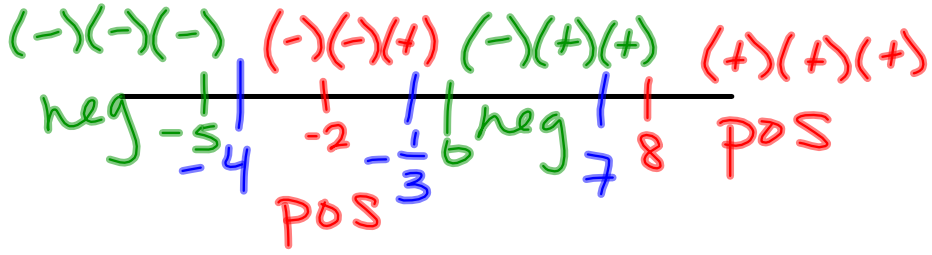
Zeros: $-3, 4$

pos: $(-3,4) \cup (4,\infty)$

neg: $(-\infty,-3)$

$f(x) = (x-7)(3x+1)(x+4)$

zeros: $x = -4, -\frac{1}{3}, 7$



pos: $(-4, -\frac{1}{3}) \cup (7, \infty)$

neg: $(-\infty, -4) \cup (-\frac{1}{3}, 7)$

Solve analytically:

$2x^3-7x^2-10x+24>0.$

$\frac{P}{q}=\frac{\pm1,2,3,4,6,8,12,24}{\pm1,2}$

looks like: $4, -2, \frac{3}{2}$

$2(x-4)(x+2)(x-\frac{3}{2})$

4 | 2 −7 −10 24
↓ 8 4 −24

−2 | 2 −4 −6 0*
↓ −3 6

$\frac{3}{2}$ | 2 −3 0*
↓ 3
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2 0

(−)(−)(−) (−)(+)(−) (−)(+)(+) (+)(+)(+)

neg | −3 | −2 | pos | 2 | neg | 4 | pos

$(-2,\frac{3}{2})\cup(4,\infty)$

Solve Graphically:

$$x^3 - 6x^2 \leq 2 - 8x$$
$$-2 + 8x \quad -2 + 8x$$

$$x^3 - 6x^2 + 8x - 2 \leq 0$$

Graph $y = x^3 - 6x^2 + 8x - 2$

$(-\infty, .325] \cup [1.46, 4.21]$

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

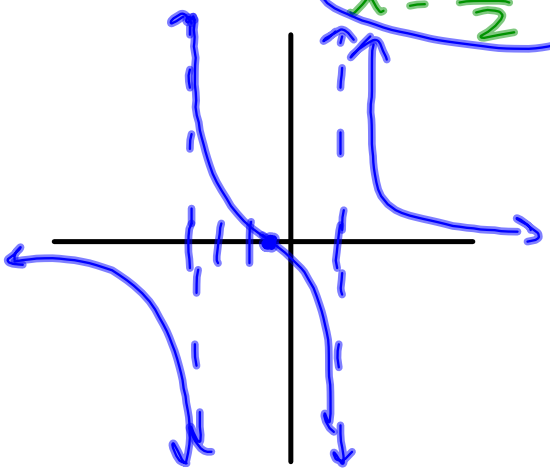
Sign chart: Find values that are zeros & undef. (VA)

VA: $(x+3)=0$ $x-1=0$

$x=-3$ $x=1$

Zeros: $2x+1=0$

$x=-\frac{1}{2}$



$$f(x) = \frac{x-1}{(2x+3)(x-4)}$$

VA: $(2x+3)(x-4) = 0$

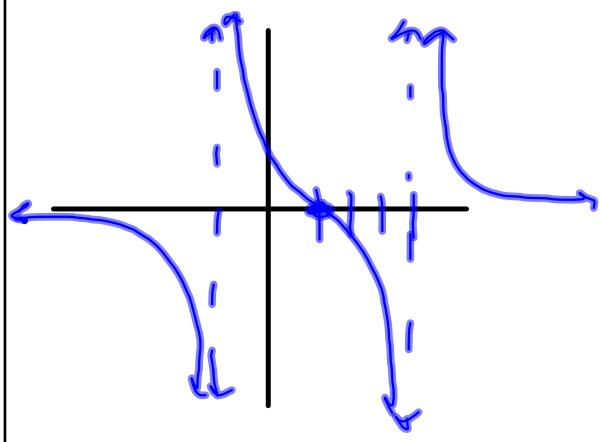
$x = -\frac{3}{2}, 4$

Zeros: $x - 1 = 0$

$x = 1$

neg | pos | neg | pos

$-\frac{3}{2}$ 1 4



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