7- 4 Solving Rational Inequalities

I can solve rational inequalities graphically.

Solving Inequalities

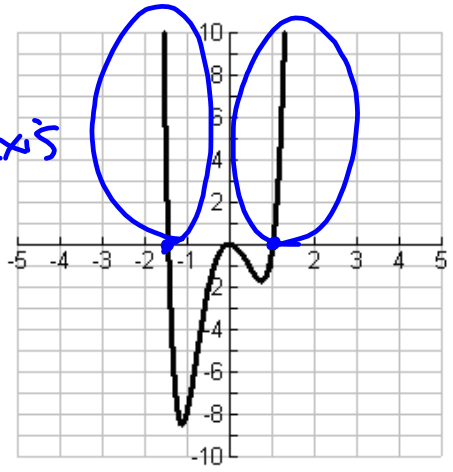
when solving an inequality, your answer is the intervals of x-values where the function (y values) meets the given conditions

Example: $f(x) > 0$ ← above x-axis

report the x values for where the y's are greater than zero

Answer:

$(-\infty, -1.5) \cup (1, \infty)$



Rational Inequalities

Goal: to find where the graph is (+) or (-) depending on the inequality sign

1. Graph the function in your calculator. Be careful that the entire denominator is in a set of parenthesis.

2. Find the x-intercept(s) and vertical asymptote(s).

3. Based on the inequality, determine if you are looking **above** the x-axis ($f(x) > 0$ or $f(x) \geq 0$) or **below** the x-axis ($f(x) < 0$ or $f(x) \leq 0$)

4. Write the intervals using the **x-values**.

(Vertical asymptotes always have round parenthesis. The inequality determines if x-intercepts have round parenthesis or square brackets.)

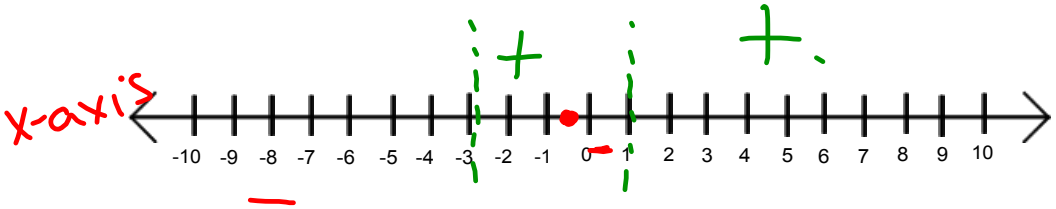
( ) or [ ]

Making a Sign Chart for a Rational Function

.x-int
.VA

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

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



Solve the rational inequality

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

$(x-5) = 0$

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

VA: $3/2, -2$

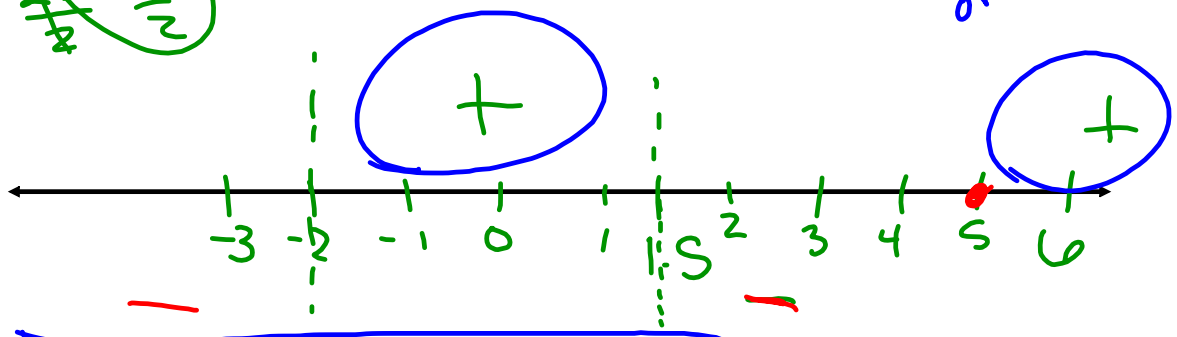
Above w/ square on x-int

$2x-3=0$

$+3 \quad +3$

$\frac{2x}{2} = \frac{3}{2}$

$x = 3/2$



$(-2, 1.5) \quad [5, \infty)$

Solve the rational inequalities

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

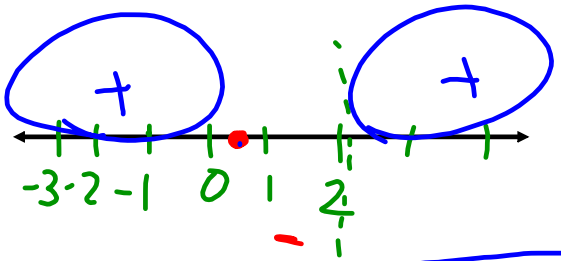
$2x-1=0$

x-int: $1/2$

$x-2=0$

VA: $x=2$

Above w/ square on x-int



$(-\infty, 1/2] \cup (2, \infty)$

$$\frac{-2x+7}{x+3} \leq 0$$

Below w/ square x-int

(VA = always round)

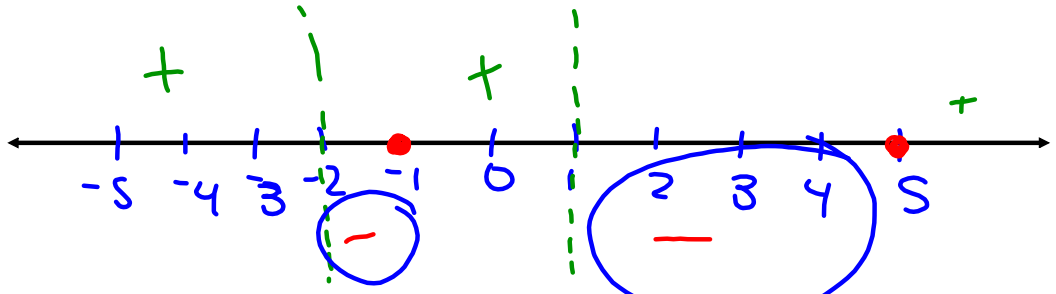
Solve the rational inequality

$$\frac{(x+1)(x-5)}{(x-1)(x+2)} \leq 0$$

x-int: -1, 5

VA: x = 1, -2

Below w/ round on x-int



$(-2, -1) \cup (1, 5)$

Solve the rational inequality

$$\frac{(2x-3)}{(x+2)(x-4)} > 0$$

x-int: $3/2 = 1.5$, $2x-3=0$

VA: -2, 4

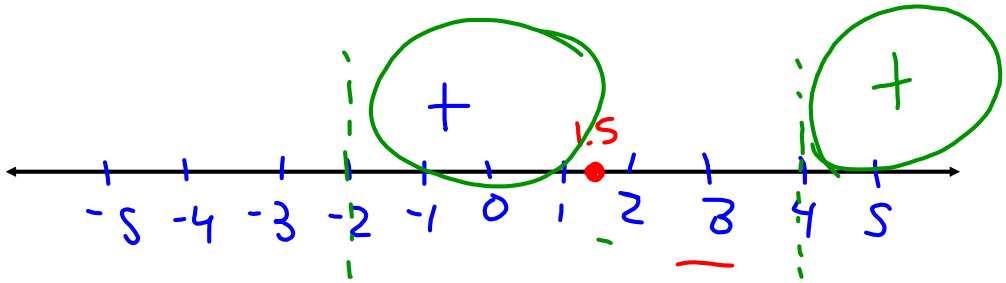
$2x-3=0$

$+3 \quad +3$

$2x = 3$

$\frac{2x}{2} = \frac{3}{2}$

Above w/ round on x-int



$(-2, 1.5) \cup (4, \infty)$