7-3 Solving Rational Inequalities

I can solve rational inequalities graphically and using a sign chart.

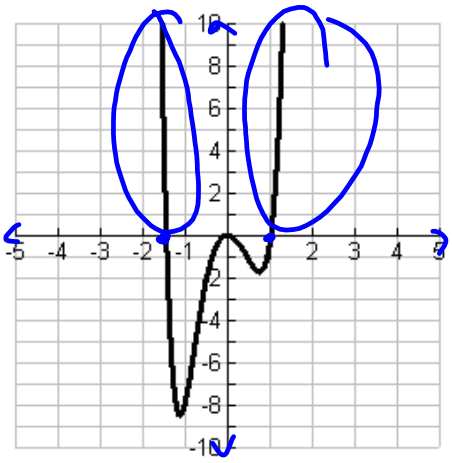
Solving Inequalities

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

Example: $f(x) > 0$ above

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

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

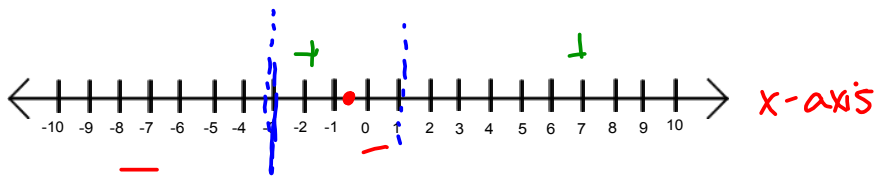


Making a Sign Chart for a Rational Function

$$f(x)=\frac{(2x+1)}{(x+3)(x-1)} = 0$$

x-int: $(0, -1/2)$

VA: $x = -3, 1$



Test:

$x = -4$

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

$x = 0$

$$\frac{+}{+\cdot -} = \frac{+}{-} = -$$

$x = -1$

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

Rational Inequalities

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

1. Find the x-intercepts, VA
2. & put on the sign chart
3. Pick x-values on the sides of the VA & x-int. and plug-in to function
4. Determine if graph is +/− at those points
5. Use inequality to decide if we want + or −
6. Write the intervals

Hint: VA always have round parenthesis

x-int depend on inequality

Solve the rational inequality

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

Solve the rational inequalities

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

x-int: $\frac{1}{2}$

VA: $x=2$

Above w/ square on x-int

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

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

$x=0$: $\frac{(-)}{(-)} = +$

$x=1$: $\frac{+}{-} = -$

$x=3$: $\frac{+}{+} = +$

$+$ $\quad$ $+$

0 $\quad$ $\frac{1}{2}$ $\quad$ $-$ $\quad$ 2

$$\boxed{\left(-\infty, \tfrac{1}{2}\right] \cup (2, \infty)}$$

depends on inequality

VA always round

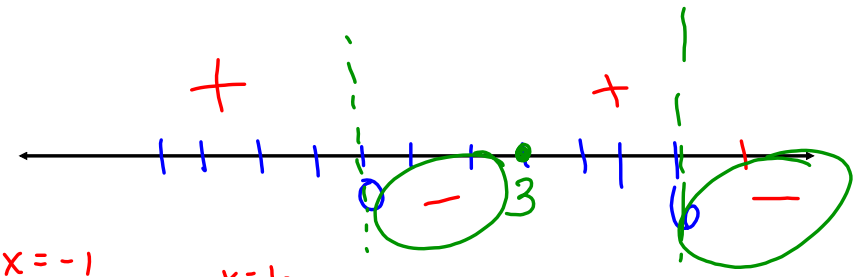
Solve the rational inequality

$$\cancel{\frac{x+2}{x}-\frac{x-4}{x-6}<0} \qquad \frac{-4x+12}{x(x-6)}<0$$

$-4(x-3)$

$\frac{-4(x-3)}{x(x-6)}$

Below x-int round



$x=-1$: $\frac{(-)(-)}{(-)(-)}=+$

$x=1$: $\frac{(-)(-)}{(+)(-)}=-$

$x=4$: $\frac{(-)(+)}{(+)(-)}=+$

$x=7$: $\frac{(-)(+)}{+(+)}=-$

<0 $\boxed{(0,3)\cup(6,\infty)}$

≤ 0 : $(0,3]\cup(6,\infty)$

Solve the rational inequality

$$\cancel{\frac{1}{x+2}-\frac{3}{x+1}>0}$$

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