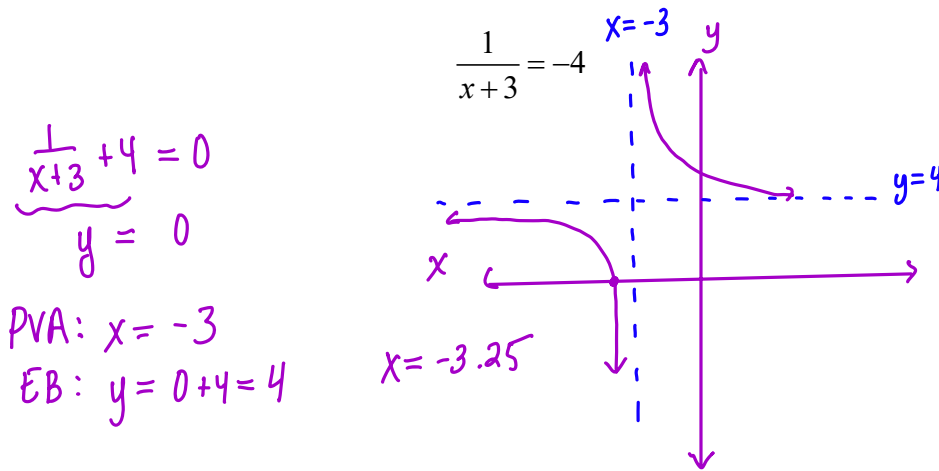


Name: _____
PC: Solving Rational Inequalities Graphically

Date: _____
Ms. Loughran

Do Now:

1. Solve the following equation graphically by doing each of the following:
 - (a) Draw a complete graph of the function showing all intercepts and asymptotes.
 - (b) Write the window settings you use on your graph.
 - (c) Find the solution set

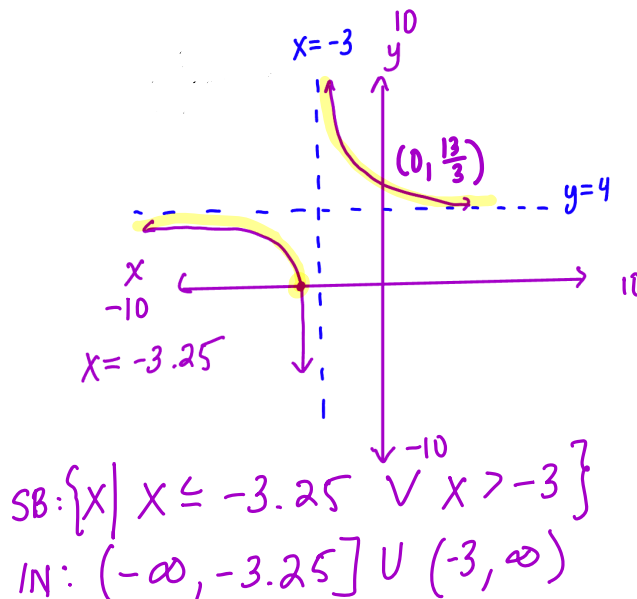


- Solve each rational inequality below graphically by doing the following:
- (a) Draw a complete graph of the function showing all intercepts and asymptotes.
 - (b) Write the window settings you use on your graph.
 - (c) Using your graph, draw a number line with critical points that shows the values of x that satisfy the inequality.
 - (d) State the solution set using both set builder notation and interval notation.

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

$\frac{1}{x+3} + 4 \geq 0$
 $y \geq 0$

PVA: $x = -3$
EB: $y = 4$



$$2. \frac{1}{x+3} > -4$$

$$\frac{1}{x+3} + 4 > 0$$

$$y > 0$$

same graph as #1

$$SB: \{x \mid x < -3.25 \vee x > -3\}$$

$$IN: (-\infty, -3.25) \cup (-3, \infty)$$

* here we are looking for where it is > 0 not ≥ 0

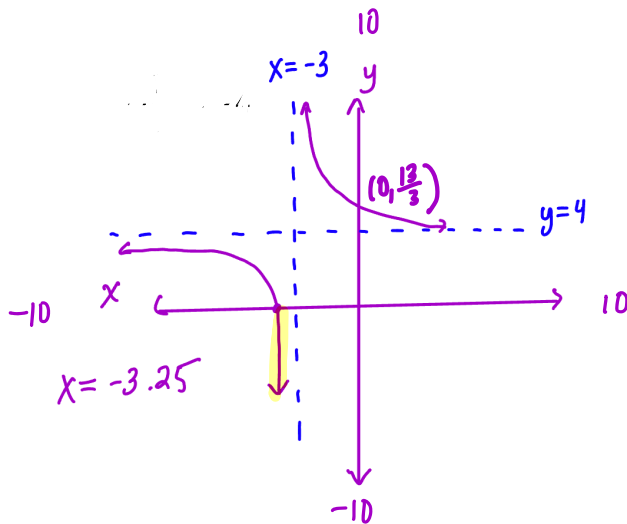
$$3. \frac{1}{x+3} \leq -4$$

$$\frac{1}{x+3} + 4 \leq 0$$

$$y \leq 0$$

$$PVA: x = -3$$

$$EB: y = 4$$



$$SB: \{x \mid -3.25 \leq x < -3\}$$

$$IN: [-3.25, -3)$$

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

$$\frac{1}{x+3} + 4 < 0$$

$$y < 0$$

$$PVA: x = -3$$

$$EB: y = 4$$

same graph as #3

$$SB: \{x \mid -3.25 < x < -3\}$$

$$IN: (-3.25, -3)$$

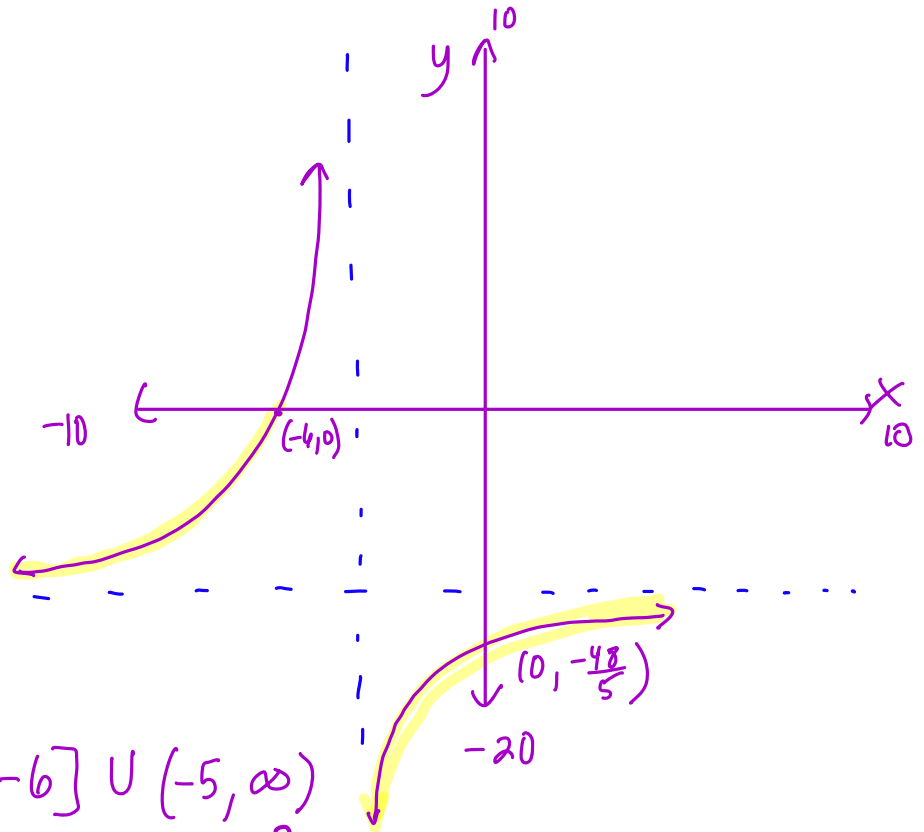
$$5. \frac{x-3}{x+5} \leq 9$$

$$\frac{x-3}{x+5} - 9 \leq 0$$

$$y \leq 0$$

PVA: $x = -5$
 EB: $y = 1 - 9 = -8$

IN: $(-\infty, -6] \cup (-5, \infty)$
 SB: $\{x \mid x \leq -6 \vee x > -5\}$



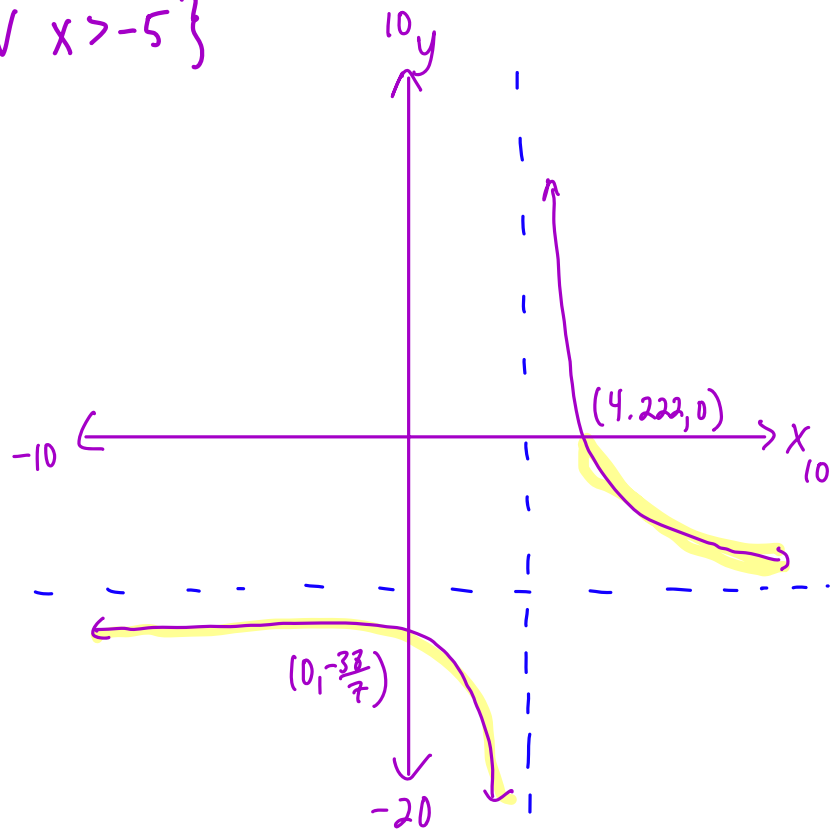
$$6. \frac{x+3}{2x-7} < 5$$

$$\frac{x+3}{2x-7} - 5 < 0$$

$$y < 0$$

PVA: $x = \frac{7}{2}$
 EB: $y = \frac{1}{2} - 5 = -\frac{9}{2}$

IN: $(-\infty, \frac{7}{2}) \cup (4.222, \infty)$
 SB: $\{x \mid x < \frac{7}{2} \vee x > 4.222\}$

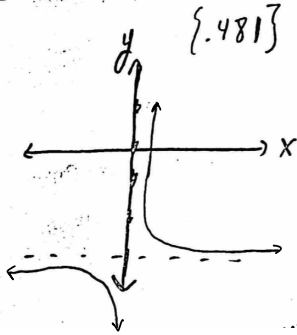


Homework 01-29

① $\frac{4}{x} + \frac{1}{3x} - 9 = 0$

PVA: $x=0$

EB $y=-9$

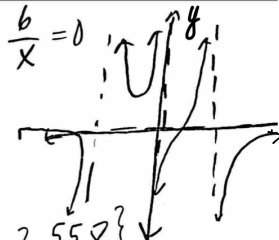


③ $\frac{2}{x+5} - \frac{3}{x-4} - \frac{6}{x} = 0$

PVA $x=-5, 4, 0$

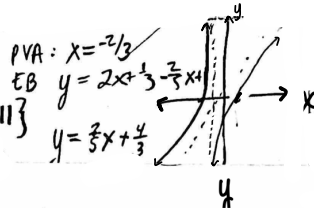
EB $y=0$

$\{-6.701, 2.558\}$



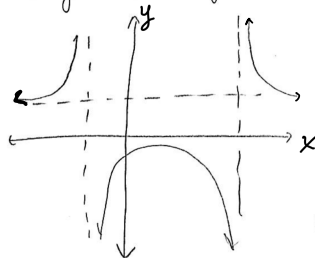
⑤ $\frac{6x^2 + 5x - 11}{3x + 2} = \frac{2x - 5}{5}$

$\{-2.311, .811\}$



⑦ $\frac{x}{x^2 - 4x + 12} - \frac{x+1}{6x} + \frac{x-3}{2x} = 0$

PVA $x=6, -2$
EB $y=0 - (-1) + 1 \Rightarrow y=2$



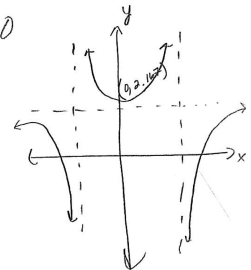
$$\begin{array}{r} 2x + \frac{1}{3} \\ 3x+2 \overline{) 6x^2 + 5x - 11} \\ \underline{6x^2 + 4x} \\ x - 11 \\ \underline{x + \frac{1}{3}} \\ -\frac{35}{3} \end{array}$$

⑨ $\frac{x^2 - 2x - 3}{x^2 - x - 6} - \frac{x}{x+2} - \frac{5-x}{x-3} = 0$

PVA $x=3, -2$

EB $y=1 - 1 - (-1) = 1$

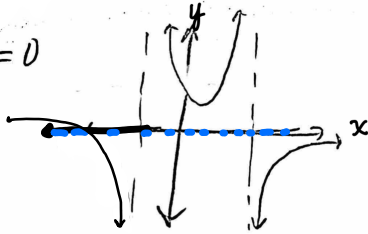
$\{-2.742, 4.742\}$



$$\textcircled{2} \quad \frac{3}{n+1} - \frac{5}{n-3} = 0$$

EB $y=0$
PVA $n = -1, 3$

$\{-1, 3\}$

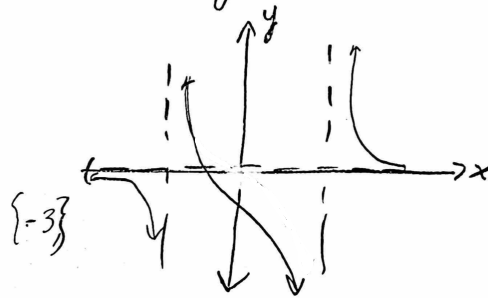


$$\textcircled{1} \quad \frac{1}{x-5} + \frac{1}{x-5} = \frac{4}{x^2-25}$$

$$\frac{1}{x-5} + \frac{1}{x-5} - \frac{4}{x^2-25} = 0$$

PVA $x = \pm 5$

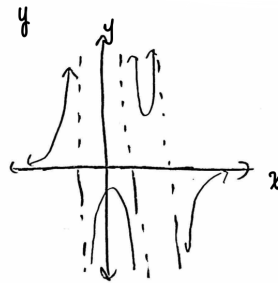
EB $y=0$



$$\frac{3}{x-1} - \frac{4}{x-2} - \frac{2}{x+1} = 0$$

⑥ PVA $x = \pm 1, 2$ \emptyset

EB $y=0$



Just so you see algebraically:

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

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

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

$$0 = 3x^2-3x+6$$

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

$$x^2-x+2=0$$

$$x = \frac{1 \pm \sqrt{1-4(1)(2)}}{2(1)}$$

$$x = \frac{1 \pm \sqrt{-7}}{2}$$

$$\frac{1 \pm i\sqrt{7}}{2}$$

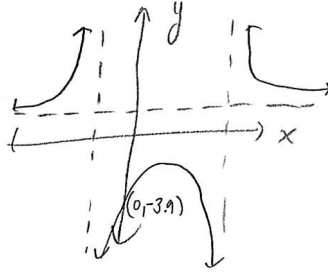
$$\textcircled{1} \frac{c+2}{c-5} - \frac{7}{c+2} = 0$$

let $x=c$

PVA $x=5, -2$

EB $y=1-0=1$

\emptyset



Again algebraically:

$$c^2 + 4c + 4 = 7c - 35$$

$$c^2 - 3c + 39 = 0$$

$$c = \frac{3 \pm \sqrt{9 - 4(1)(39)}}{2(1)} \quad \text{imaginary roots}$$

Practice

Solve each rational inequality below graphically by doing the following:

- Draw a complete graph of the function showing all intercepts and asymptotes.
- Write the window settings you use on your graph.
- Using your graph, draw a number line with critical points that shows the values of x that satisfy the inequality.
- State the solution set using both set builder notation and interval notation.

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

4. $\frac{2}{x-2} + \frac{5}{x} \leq 7$

2. $\frac{x^2-x+1}{x+2} < 3$

5. $\frac{3}{x-1} + \frac{2}{x} \geq 8$

3. $\frac{x-1}{x^2-4} \leq 0$

6. $\frac{x-1}{x+4} + \frac{2}{x-8} \geq 10$