Warm Up

Write a polynomial with the roots ±1, ±√2

$x = 1, \; x = -1, \; x = \sqrt{2}, \; x = -\sqrt{2}$

$x - 1 = 0, \; x + 1 = 0, \; x - \sqrt{2} = 0, \; x + \sqrt{2} = 0$

$(x-1)(x+1)(x-\sqrt{2})(x+\sqrt{2}) = 0$

$(x^2 - 1)(x^2 + x\sqrt{2} - x\sqrt{2} - 2) = 0$

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

Objective: SWBAT solve inequalities with polynomial and rational equations

Agenda:

- Warm Up
- HW Huddle
- Notes
- Practice
- Reflection

HW:
Creating Rational Inequalities
#1-6

Notes: Critical Points

Critical points are values of x that make the function 0 (intercepts) or undefined (asymptotes/holes)

Notes: Solving Graphically

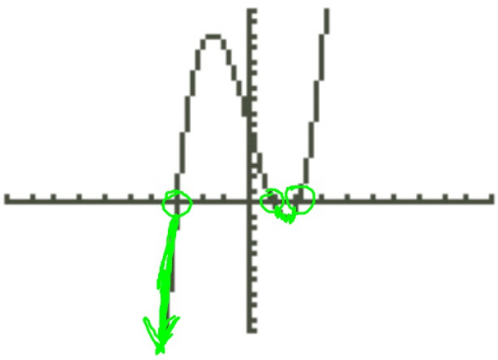
Steps:

1. Rearrange so one side of the inequality is 0
2. Find the critical points
3. Graph the corresponding function
4. Shade the graph according to inequality rules
5. Give the range of x values

ex) $x^3 - 7x + 6 < 0$

critical: $x = -3, 1, 2$

$x < -3, \quad 1 < x < 2$



Notes: Rational Inequalities

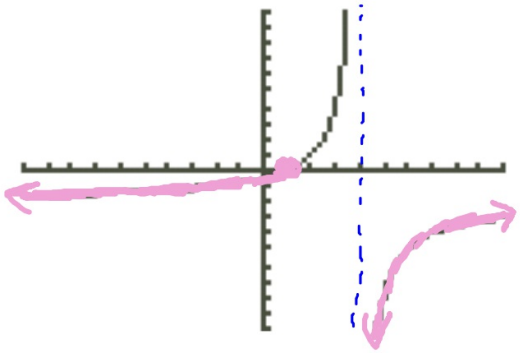
- Critical points can come from the numerator or denominator.
- Remember: If a function has a vertical asymptote at a number, x *can't equal the number*.

ex) $\frac{-2x + 2}{x - 4} \leq 0$

$-2x + 2 = 0$ $\quad x - 4 = 0$

$x = 1$ $\quad x = 4$

$x \leq 1 \text{ , } x > 4$



Ashrita makes and sells leather goods. One of her new products is a belt. Her startup cost for tools and equipment to make the belts is $160 and it costs her $10 to make each belt. She sells each belt for $18. Ashrita wants to earn an average profit of at least $5 per belt. How many belts could she make and sell to earn an average profit of at least $5 per belt? What will be her minimum profit if she achieves her goal?

$x = \#\text{ belts}$

$C = 10x + 160$

$R = 18x$

$P = 18x - (10x + 160)$

$= 8x - 160$

$P_{avg} = \frac{8x - 160}{x} \geq 5$

$-5 \quad -5$

$\frac{8x - 160}{x} - 5 \geq 0$

$\frac{8x - 160 - 5x}{x} = \frac{3x - 160}{x} \geq 0$

$3x - 160 = 0 \text{ , } x = 0$

$x = 53.\overline{3} \text{ , } x = 0$

~~$x \neq 0$~~, $x \geq 53.3$

at least 54 belts $\rightarrow P = 8(54) - 160$

$= \$272$

Practice

Practice Worksheet: Creating Rational Inequalities

Reflection

What is another name for the critical values in a polynomial inequality?