

Polynomial and Rational Inequalities

Complete Polynomial Inequalities notes and Rational Inequalities (from last year) on my website under "Notes 2014-2015"

Also, look at absolute value inequalities notes from last year before you do the Day 7 assignment.

Polynomial Inequalities: Solve. State the answer in interval notation.

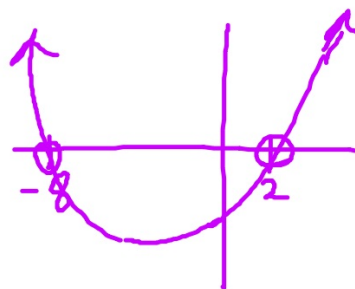
1) $x^2 + 6x - 16 > 0$
 $(x + 8)(x - 2) > 0$
 $x = -8, x = 2$

$x < -8$ $-$ 0 $+$ $x > 2$

$$(-\infty, -8) \cup (2, \infty)$$

Steps

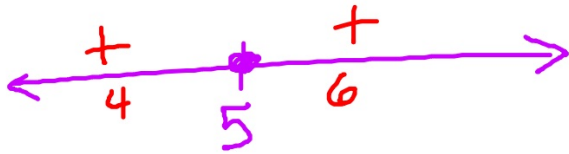
1. Find the real zeros
2. Make a number line
Test each region.
3. State the answer



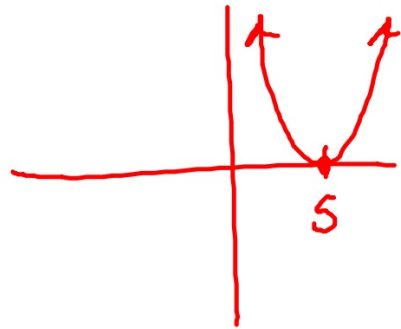
5) $x^2 - 10x + 25 \geq 0$

$(x-5)(x-5) \geq 0$ — positive

$x = 5$



$(-\infty, \infty)$



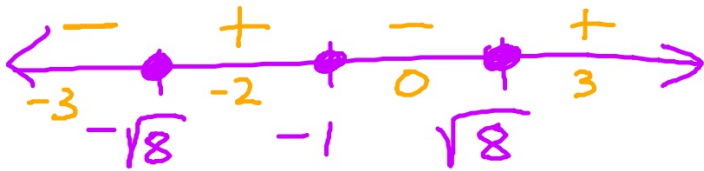
$$6) \quad x^3 + x^2 - 8x - 8 \geq 0$$

$$x^2(x+1) - 8(x+1) \geq 0$$

$$(x^2 - 8)(x+1) \geq 0$$

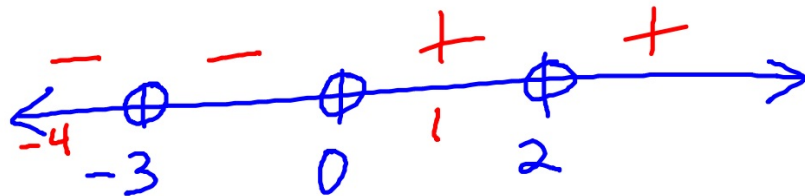
$$x = \pm\sqrt{8}, -1$$

positive
(+)



$$[-\sqrt{8}, -1] \cup [\sqrt{8}, \infty)$$

9) $x(x-2)^2(x+3)^4 < 0$ negative (-)



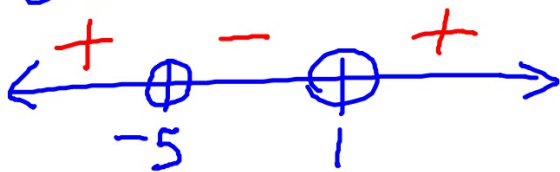
$(-\infty, -3) \cup (-3, 0)$

Rational Inequalities

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

negative
(-)

Crit. #'s $x=1, -5$



(-5, 1)

Steps

- 1) 0 on one side and 1 term on the other
- 2) Find the critical numbers (real zeros of the numerator and den.)
- 3) Make a number line
Test each region.
- 4) Write answer in interval notation.

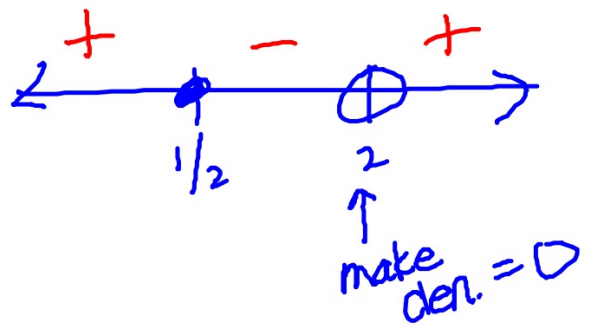
$$2) \quad \frac{6}{x-2} \geq -4 \quad \text{positive (+)}$$

$$\frac{6}{x-2} + \frac{4}{1} \geq 0$$

$$\frac{6 + 4(x-2)}{x-2} \geq 0$$

$$\frac{4x-2}{x-2} \geq 0$$

$$\text{crit \#s : } x = 2, \frac{1}{2}$$

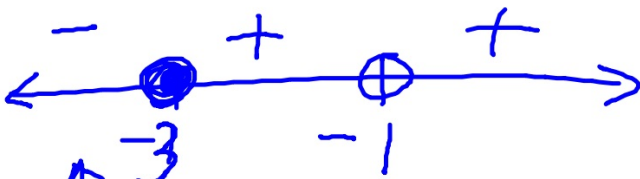


$$(-\infty, \frac{1}{2}] \cup (2, \infty)$$

$$5) \frac{x^2 + 4x + 3}{x+1} \leq 0$$

$$\frac{(x+3)(x+1)}{x+1} \leq 0$$

$$x+3 \leq 0$$



$$(-\infty, -3]$$

6) $\frac{X^2 + 1}{X^2 + 4} \leq 0$ *negative*



No solution