

Warm up: Solve the inequality

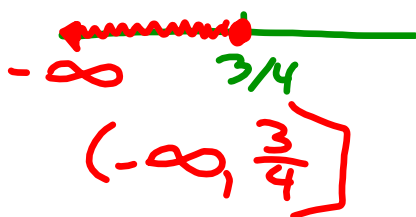
$$1. \quad 5 - x \geq 3x + 2$$

$$\begin{array}{r} -3x \quad -3x \\ \hline 5 - 4x \geq 2 \end{array}$$

$$5 - 4x \geq 2$$

$$\begin{array}{r} -4x \geq -3 \\ \hline -4 \quad -4 \end{array}$$

$$x \leq \frac{3}{4}$$



$$2. \quad -8 \leq -x + 6 \leq 10$$

$$\begin{array}{r} -6 \quad -6 \quad -6 \\ \hline -14 \leq -x \leq 4 \end{array}$$

$$\begin{array}{r} -14 \leq -x \leq 4 \\ \hline -1 \quad -1 \quad -1 \end{array}$$

$$14 \geq x \geq -4$$



$$[-4, 14]$$

Solve:

$$x + 2 \geq 5$$

$$x \geq 3$$

$[3, +\infty)$ Interval Notation



$$x + 2 > 5$$

$$x > 3$$

$$(3, +\infty)$$

3.7

Solving Polynomial Inequalities:

1. Solve for all real zeros (*factoring*)
2. Plot zeros on a number line
3. Test the intervals OR sketch a graph using the end behavior
4. Write answers in interval notation

$>$ or $<$ open pt so parenthesis
 \geq or \leq closed pt so bracket

1. Solve: $x^2 - 3x - 18 \leq 0$ *means it will be negative*

*even degree
+ L.C.*

$$x^2 - 3x - 18 = 0$$

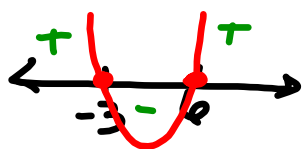
$$(x+3)(x-6) = 0$$

$$x+3=0 \quad x-6=0$$

$$x = -3 \quad x = 6$$

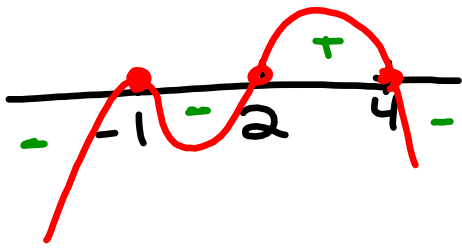
*you want -y-values
bc ≤ 0*

$$[-3, 6]$$



Testing intervals:

- Interval $(-4, -3)$: $16 + 12 - 18 = 10 \leq 0$ **F**
- Interval $(-3, 6)$: $0 - 3(0) - 18 = -18 \leq 0$ **T**
- Interval $(6, 7)$: $(7)^2 - 3(7) - 18 \leq 0$ $10 \leq 0$ **False**



$$\leq 0 \quad (-\infty, 2] \cup [4, \infty)$$

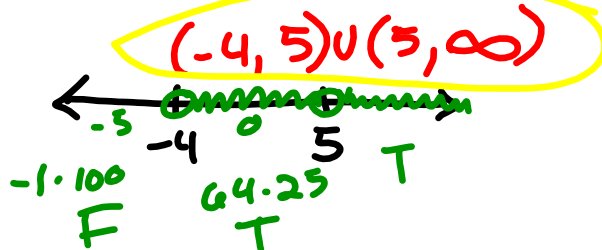
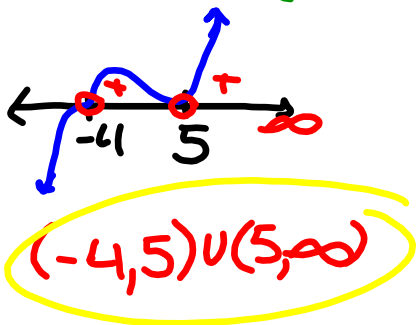
$$\geq 0 \quad [2, 4]$$

2. Solve: $(x+4)^3(x-5)^2 > 0$

deg = 5
+ LC

$(x+4)^3 = 0$
 $x+4=0$
 $x=-4$
 3 times
 crosses

positive
 doesn't include
 points
 $(x-5)^2 = 0$
 $x-5=0$
 $x=5$
 2 times
 bounces



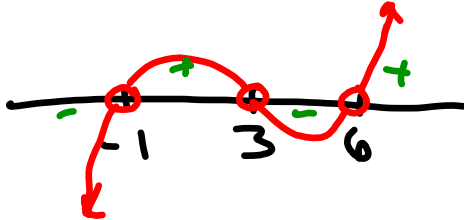
3. Solve: $(x-3)(x+1)^3(x-6) \geq 0$

$$x-3=0 \\ x=3$$

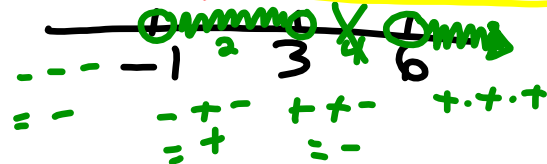
$$x+1=0 \\ x=-1 \\ \text{mult. of } 3$$

$$x-6=0 \\ x=6$$

roots aren't included ()



$$(-1, 3) \cup (6, \infty)$$



4. Solve: $x^3 + 2x^2 - 9x < 18$

$$(x^3 + 2x^2 - 9x - 18) < 0$$

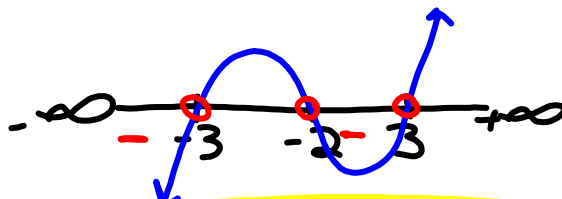
points are not included

$$x^2(x+2) - 9(x+2) = 0$$

$$(x+2)(x^2-9) = 0$$

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

$$x = -2 \quad x = -3 \quad x = 3$$



$$(-\infty, -3) \cup (-2, 3)$$