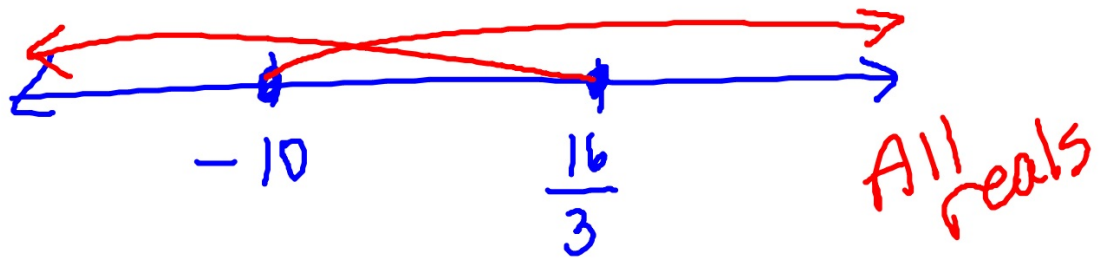


$$25.) \quad 3 + 4|3x+7| \geq -89$$

$$|3x+7| \geq -23$$

$$3x+7 \geq -23 \quad \text{or} \quad 3x+7 \leq 23$$

$$x \geq -10 \quad \text{or} \quad x \leq \frac{16}{3}$$



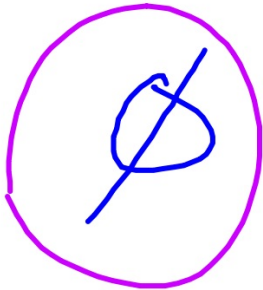
$$19.) \quad 9|r-2|-10 < -73$$

$$|r-2| < -7$$

pos.
zero

$$8 < -7$$

$$0 < -7$$



$$21.) \quad x + 12 < 2x + 10$$

$$2 < x$$

$$4|6-2a| + 8 \leq 24 \text{ and}$$

$$|6-2a| \leq 4$$

$$6-2a \leq 4$$

$$-2a \leq -2$$

$$a \geq 1$$

$$6-2a \geq -4$$

$$-2a \geq -10$$

$$a \leq 5$$

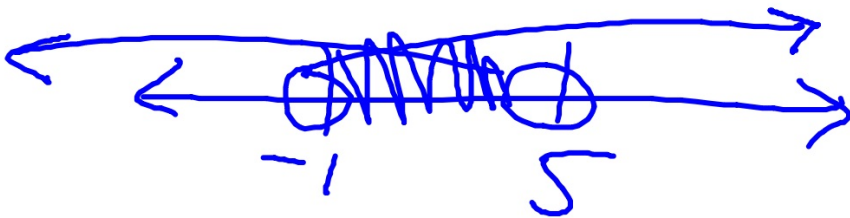
and



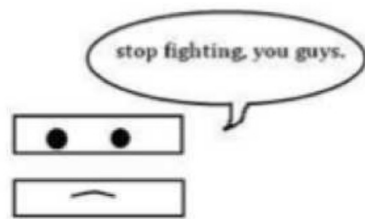
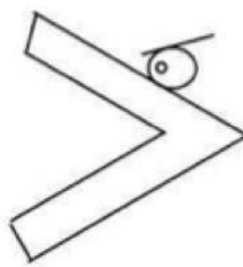
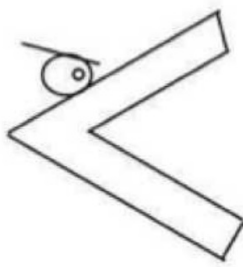
$$9.) \quad |x-2|-5 < -2$$

$$|x-2| <^{\text{and}} 3$$

$$x-2 < 3 \quad \underline{\text{and}} \quad x-2 > -3$$
$$x < 5 \quad \quad \quad x > -1$$



Polynomial Inequalities



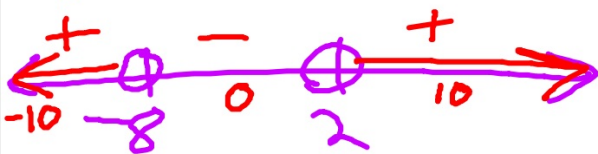
*See printout.

Polynomial Inequalities

ex: Solve.

$$a) x^2 + 6x - 16 > 0$$

$$(x + 8)(x - 2) > 0$$



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

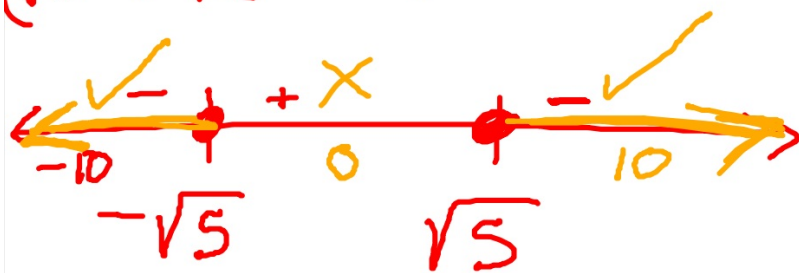
Steps

- 1) Set inequality to zero
- 2) factor (if possible)
- 3) Find the zeros. Plot on number line
- 4) Find the "true" regions

ex: Solve.

b) $5 - x^2 \leq 0$

$(\sqrt{5} + x)(\sqrt{5} - x) \leq 0$



$(-\infty, -\sqrt{5}] \cup [\sqrt{5}, \infty)$

ex: Solve.

$$c) x^2 + 4x + 11 \geq 0$$

$$\frac{-4 \pm \sqrt{16 - 4(1)(11)}}{2(1)}$$

$$\frac{-4 \pm \sqrt{-28}}{2}$$

$$\leftarrow \begin{array}{c} + \\ (-\infty, \infty) \end{array} \rightarrow$$

$$d.) x^2 + 4x + 11 < 0$$

$$\leftarrow \begin{array}{c} + \end{array} \rightarrow$$

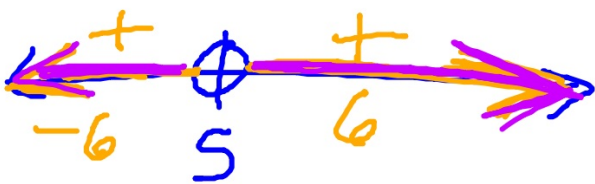
never happens

\emptyset

ex: Solve.

e) $x^2 - 10x + 25 > 0$

$$(x-5)^2 > 0$$

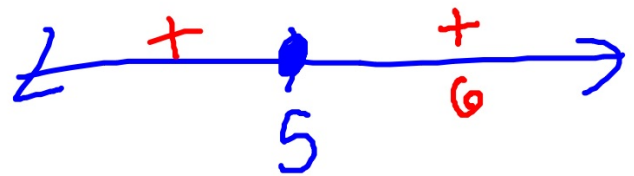


$$(-\infty, 5) \cup (5, \infty)$$

$$\{x \mid x \neq 5\}$$

f.) $x^2 - 10x + 25 \leq 0$

$$(x-5)^2 \leq 0$$



$$[5]$$

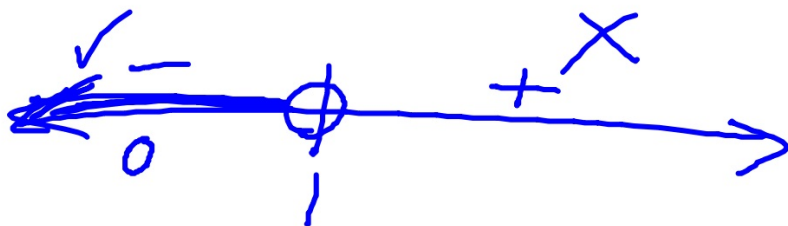
$$\{x \mid x = 5\}$$

$$\{5\}$$

ex: Solve.

$$g) x^3 - 1 < 0$$

$$(x-1)(x^2+x+1) < 0$$



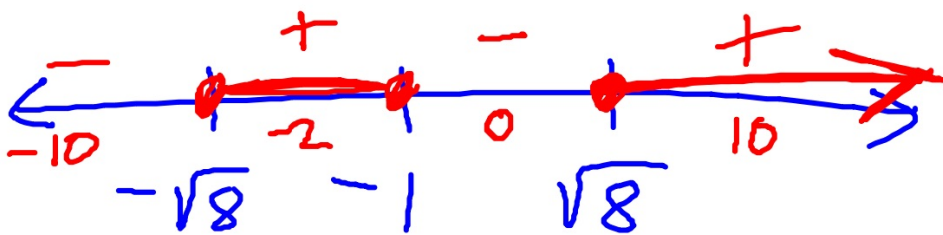
$$(-\infty, 1)$$

ex: Solve.

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

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

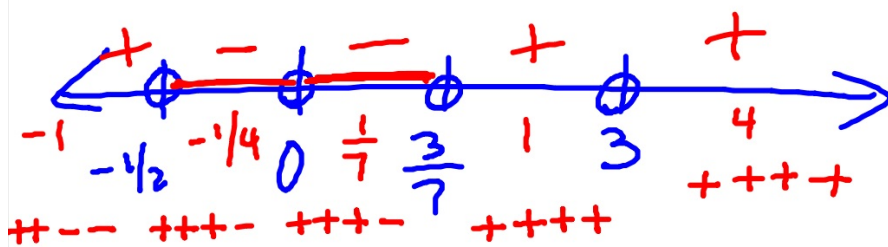
$$(x^2 - 8)(x+1) \geq 0$$



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

ex: Solve.

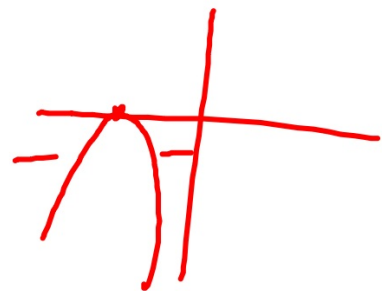
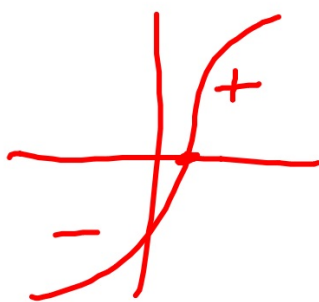
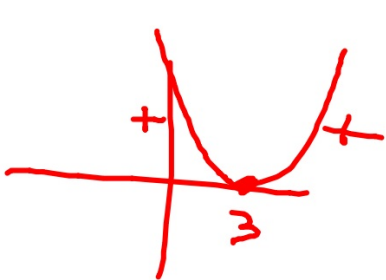
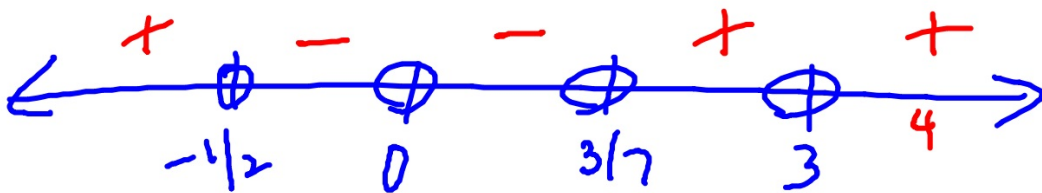
$$i) x^2(x-3)^4(2x+1)(7x-3)^3 < 0$$



$$\left(-\frac{1}{2}, 0\right) \cup \left(0, \frac{3}{7}\right)$$

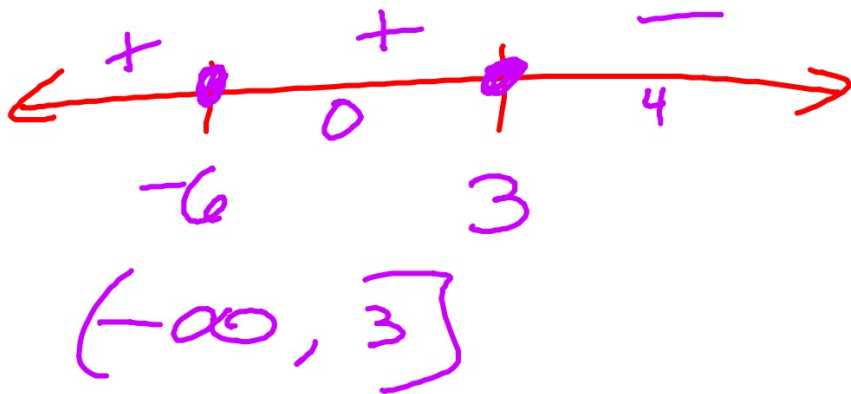
ex: Solve.

$$i) x^2(x-3)^4(2x+1)(7x-3)^3 < 0$$

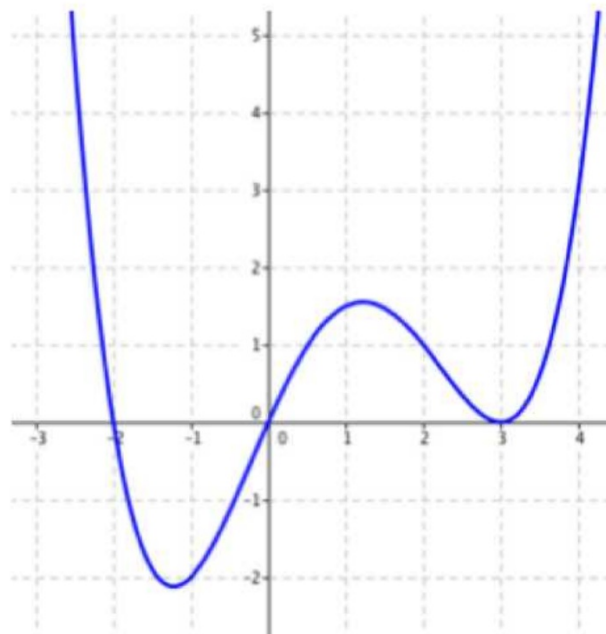


ex: Solve.

$$j) -2(x-3)(x+6)^{100} \geq 0$$



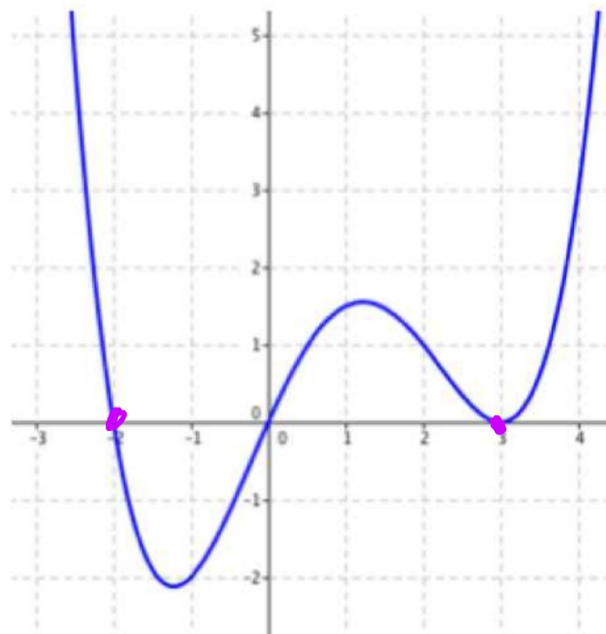
ex: Solve graphically given the graph of $f(x)$.



a) $f(x) < 0$

$(-2, 0)$

ex: Solve graphically given the graph of $f(x)$.



b) $f(x) \geq 0$ $(-\infty, -2] \cup [0, \infty)$