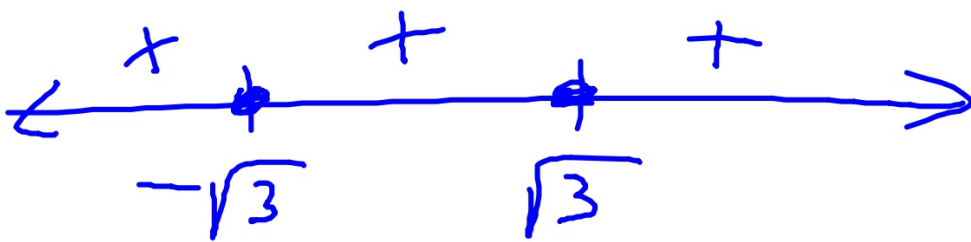


$$0 = (x^4 - 6x^2 + 9)$$

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

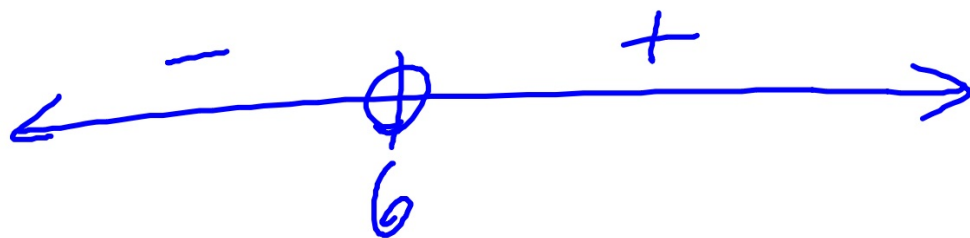
$$\downarrow \quad 0 = (x + \sqrt{3})^2 (x - \sqrt{3})^2$$



$$3) f(x) \leq 0$$

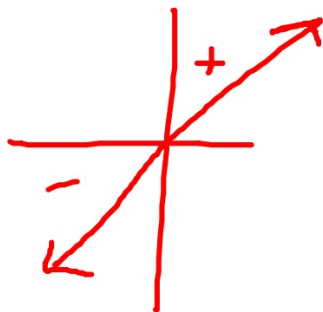
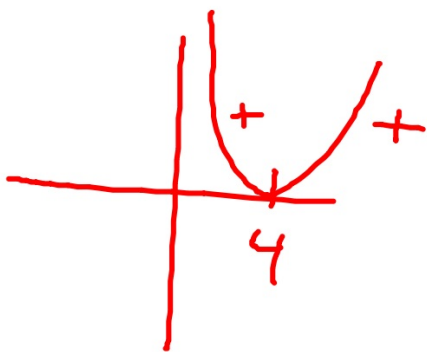
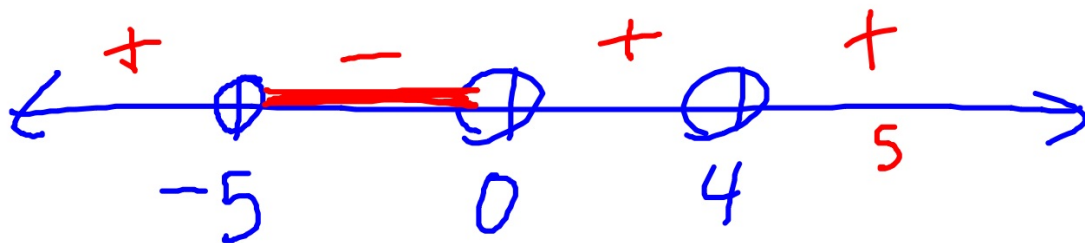
$$[-\sqrt{3}] \cup [\sqrt{3}]$$

9.) $(x-6)(x^2+6x+36) \rightarrow 0^+$

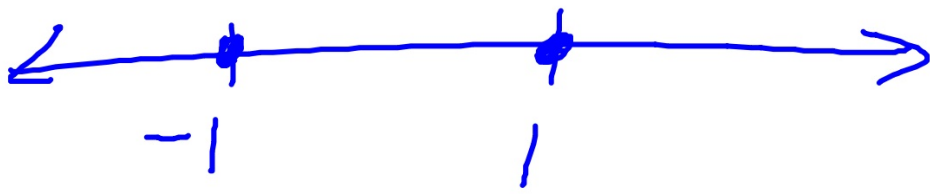


$(6, \infty)$

$$12) x(x-4)^2(x+5)^3 < 0$$



$$8.) \quad (x^2 + 36)(x^2 - 1) \geq 0$$

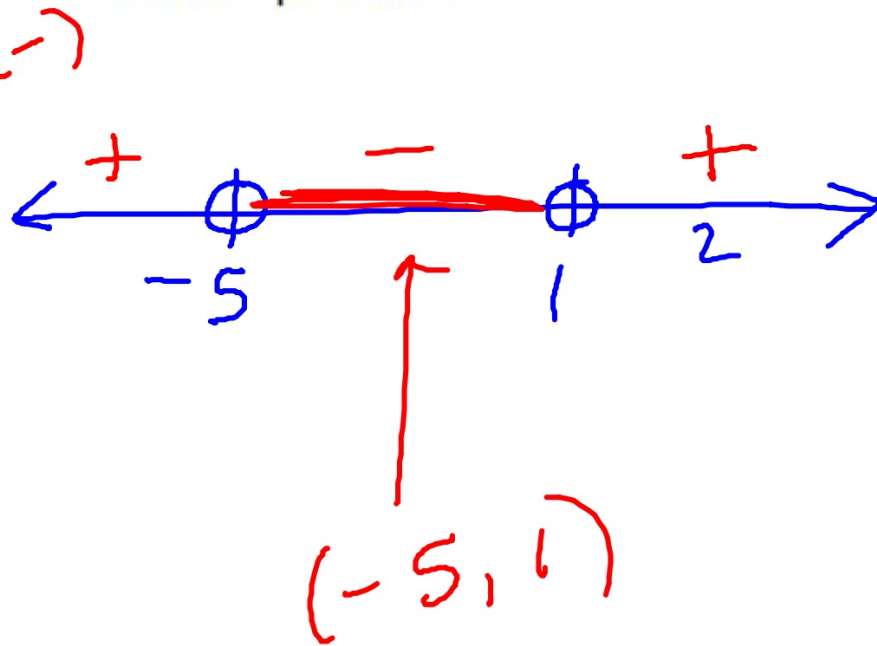


Rational Inequalities

critical numbers - real zeros of the numerator and denominator in a rational expression

ex: Solve.

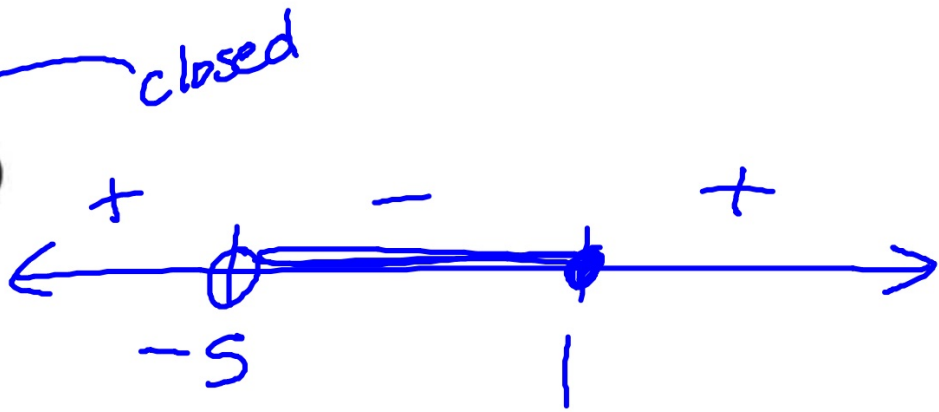
a) $\frac{x-1}{x+5} < 0$



ex: Solve.

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

open



$[-5, 1]$

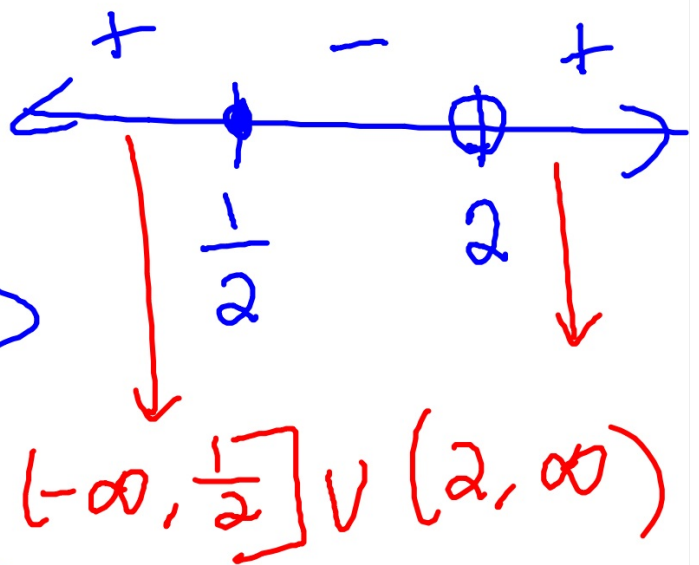
ex: Solve.

$$c) \frac{6}{x-2} \geq -4$$

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

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

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

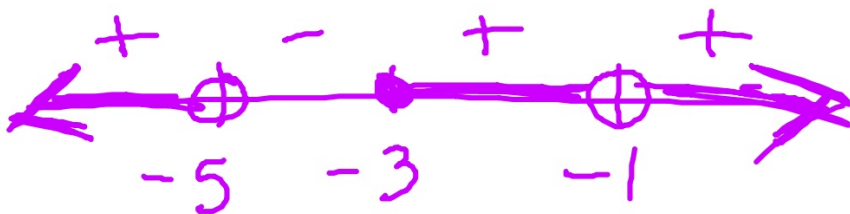


ex: Solve.

$$d) \frac{x^2 + 4x + 3}{x^2 + 6x + 5} \geq 0$$

$$\frac{1 - 4 + 3}{1 - 6 + 5} = 0$$

$$\frac{(x+3)(\cancel{x+1})}{(x+5)(\cancel{x+1})} \geq 0$$

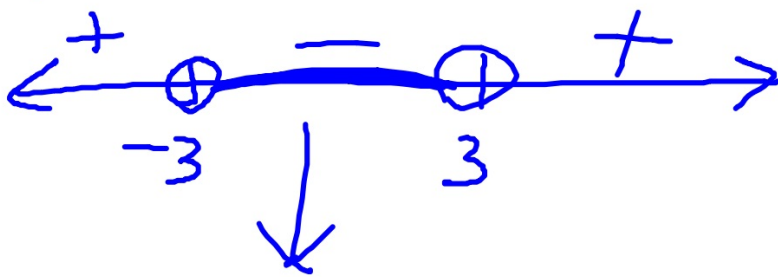


$$(-\infty, -5) \cup [-3, -1) \cup (-1, \infty)$$

ex: Solve.

$$e) \frac{x^2 + 9}{x^2 - 9} < 0$$

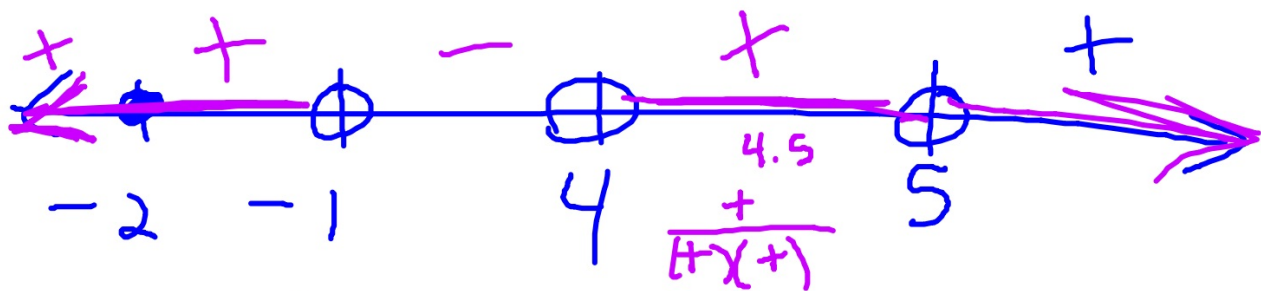
$$(x-3)(x+3)$$



$$(-3, 3)$$

ex: Solve.

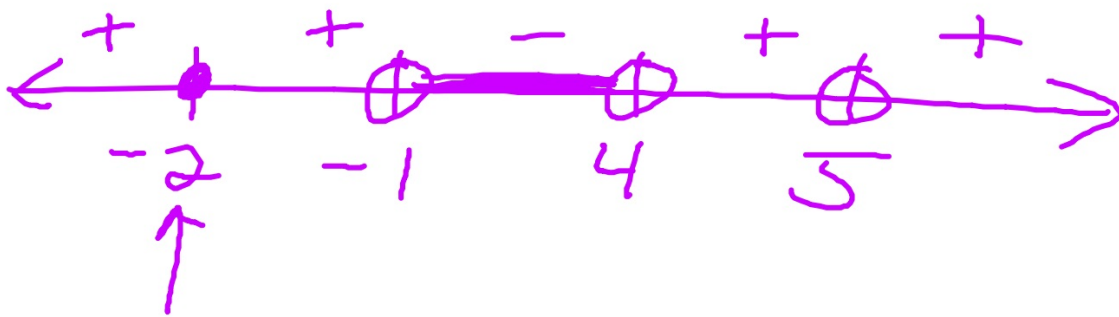
$$f) \frac{(x+2)^2(x-5)}{(x+1)(x-5)(x-4)^3} \geq 0$$



$$(-\infty, -1) \cup (4, 5) \cup (5, \infty)$$

ex: Solve.

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



$$[-2] \cup (-1, 4)$$

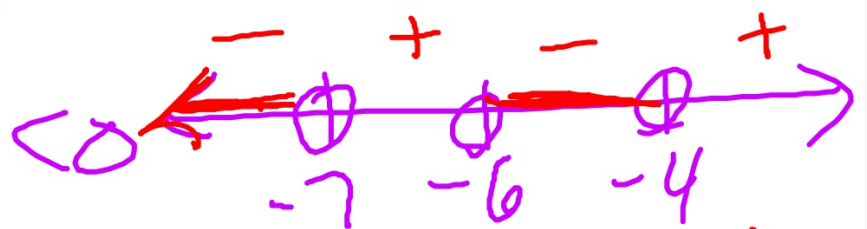
ex: Solve.

$$g) \frac{3}{x+4} < \frac{1}{x+6}$$

$$\frac{3(x+6)}{x+4(x+6)} - \frac{1(x+4)}{x+6(x+4)} < 0$$

$$\frac{3(x+6) - (x+4)}{(x+4)(x+6)} < 0$$

$$\frac{2x+14}{(x+4)(x+6)} < 0$$



$$(-\infty, -7) \cup (-6, -4)$$