Rational Inequalities

Steps:

1) 0 on one side and 1 term on the other

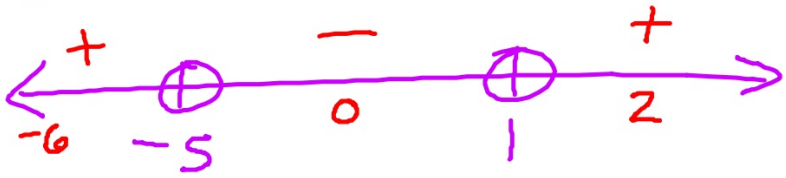
2) Find the critical numbers (real zeros of the numerator and denominator

3) make a number line

4) Write your answer in interval notation

1 $\dfrac{x-1}{x+5} < 0$

Crit. numbers $x = 1, -5$



$(-5, 1)$

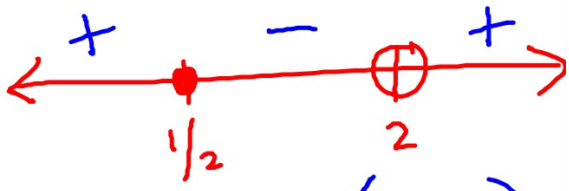
(2) $\dfrac{6}{x-2} \geq -4$

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

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

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

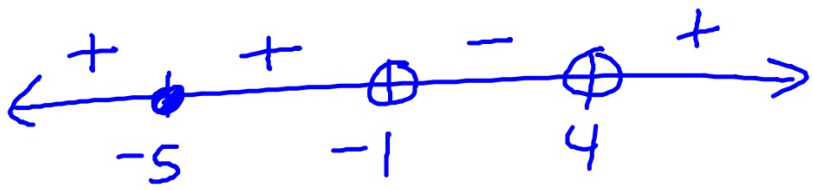
Crit. $x = 2, 1/2$



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

3

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

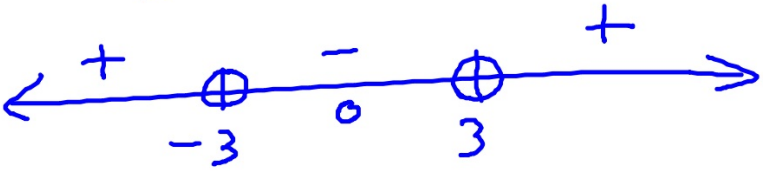


$(-\infty, -1) \cup (4, \infty)$

4

$$\frac{x^2+9}{x^2-9} \leq 0$$

$$x = 3, -3$$



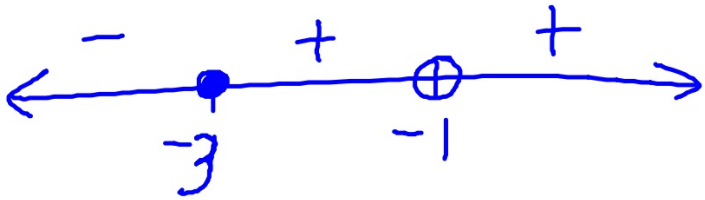
$$(-3, 3)$$

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

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

A cancellation (still include this value)

Crit.
$x=-1,-3$



$x+3 \leq 0$

$(-\infty, -3]$

6 $\dfrac{x^2+1}{x^2+4} \leq 0$

$+$

no critical numbers

no solution

7 $\dfrac{x^2+2x-1}{x^2+1} > 0$

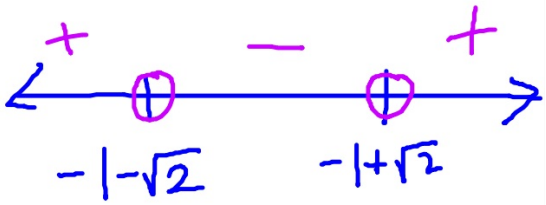
$x = \dfrac{-2 \pm \sqrt{4-4(1)(-1)}}{2(1)}$

$x = \dfrac{-2 \pm \sqrt{8}}{2}$

$x = \dfrac{-2 \pm 2\sqrt{2}}{2}$

$x = -1 \pm \sqrt{2}$

Crit. values



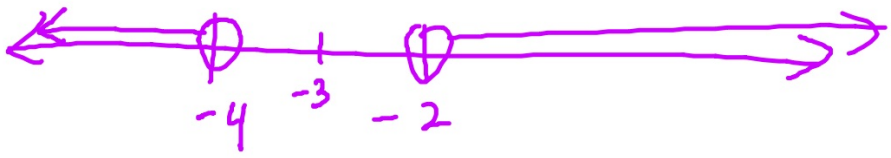
$(-\infty, -1-\sqrt{2}) \cup (-1+\sqrt{2}, \infty)$

HW

6

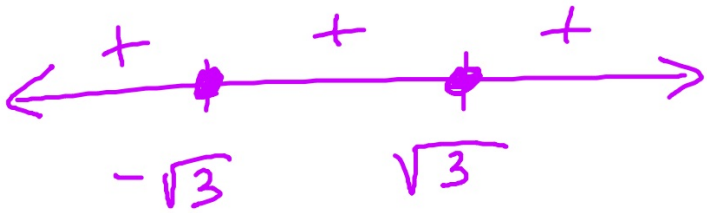
$$|x-1| \leq 5$$

7



$$|x+3| > 1$$

(10) $(x^2-3)^2 \leq 0$



$x = -\sqrt{3}, \sqrt{3}$

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

$\{x \mid x = -\sqrt{3}, \sqrt{3}\}$

17) $x^3 - 11x^2 - 8x + 88 \geq 0$

$x^2(x-11) - 8(x-11) \geq 0$

$(x^2-8)(x-11) \geq 0$