

$$7.) \quad \frac{3}{4} - \frac{1}{x-3} - \frac{x}{x+4} > 0$$

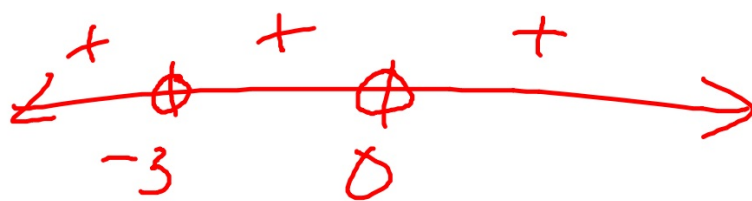
$$\frac{3(x-3)(x+4) - 4(x+4) - 4x(x-3)}{4(x-3)(x+4)} > 0$$

$$\frac{-x^2 + 11x - 52}{4(x-3)(x+4)} > 0$$

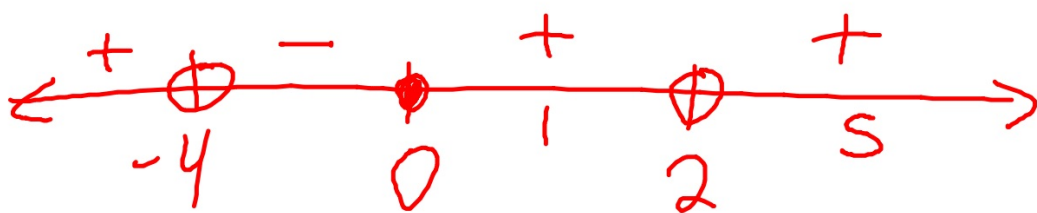
$$\frac{-(x^2 - 11x + 52)}{4(x-3)(x+4)} > 0$$



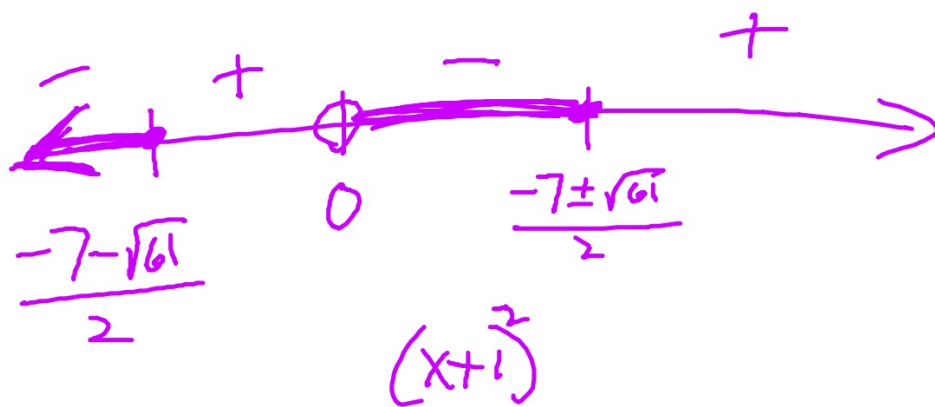
$$x^2(x+3)^2 < 0$$



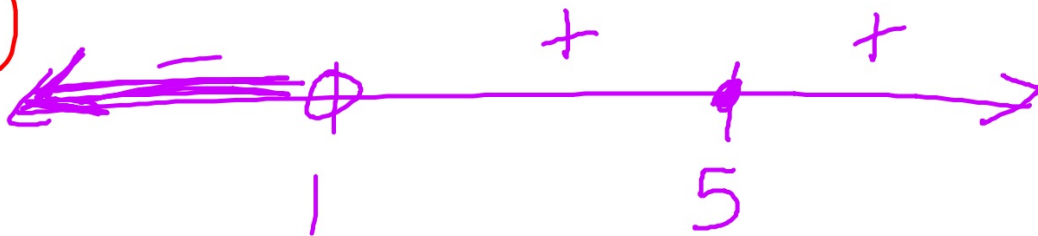
$$\frac{x(x-2)}{(x-2)(x+4)} \leq 0$$



$$5) \frac{x^2 + 7x - 3}{x} \leq 0 \quad \frac{-7 \pm \sqrt{61}}{2}$$



4.)

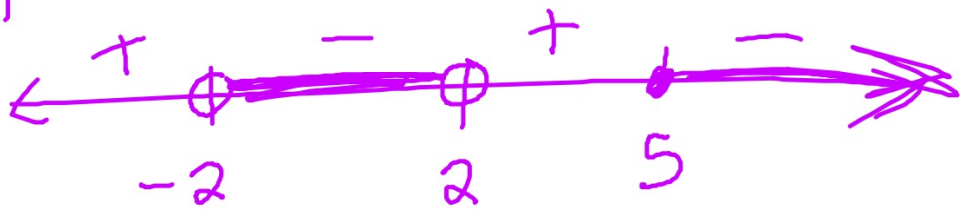


$$(-\infty, 1) \cup [5]$$

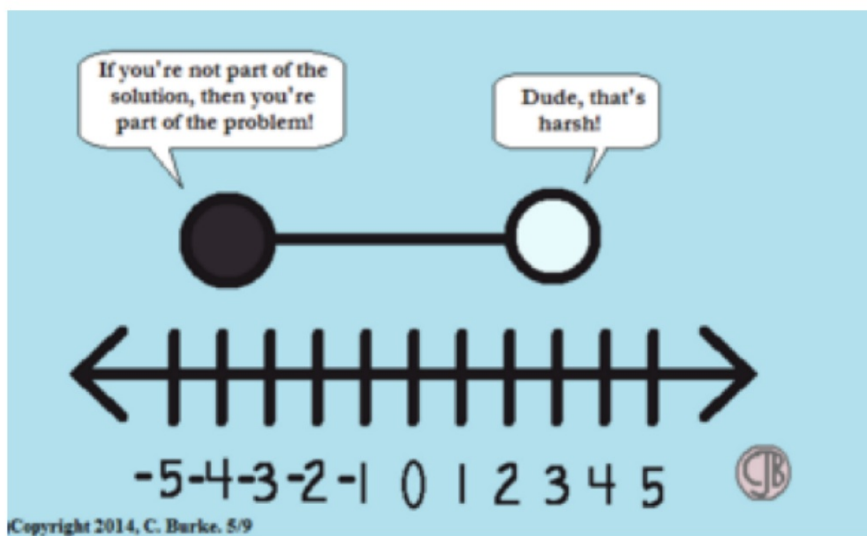
$$\frac{(x-5)^{\textcircled{2}}}{(x^2+4)(x-1)^3} \leq 0$$

↑

2)



Solving exponential and log Inequalities



HW:

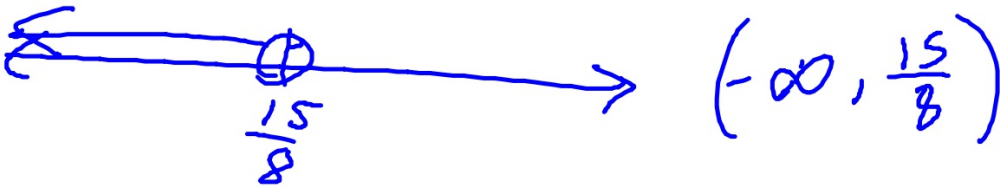
*Skip 2,
5, 16*

Solve.

$$1) \quad 16^{2x-3} < 8$$
$$2^{4(2x-3)} < 2^3$$

$$4(2x-3) < 3$$

$$x < \frac{15}{8}$$



Exponentials have domain all reals (no restrictions)

However, logs do not have domain all reals and must be checked

$$2) \log 5^{x-3} \geq \log 7$$

$$\frac{(x-3) \log 5}{\log 5} \geq \frac{\log 7}{\log 5}$$

$$x-3 \geq \log_5 7$$

$$x \geq 3 + \log_5 7$$

$$[3 + \log_5 7, \infty)$$

3)

$$3^{2x} + 2 \cdot 3^x - 8 > 0$$

$$(3^x + 4)(3^x - 2) > 0$$

$$\downarrow$$
~~$$3^x - 4$$~~

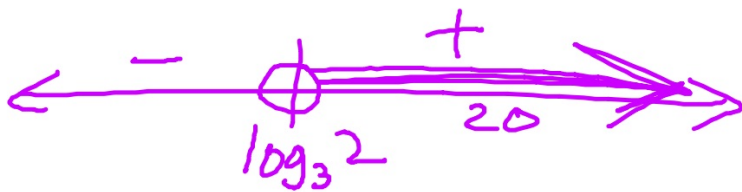
$$\downarrow$$

$$3^x = 2$$

$$x = \log_3 2$$

$$x^2 + 2x - 8$$

$$(x+4)(x-2)$$



$$(\log_3 2, \infty)$$

$$3a.) \quad 4^{2x} - 5 \cdot 4^x - 24 \geq 0$$

$$(4^x - 8)(4^x + 3) \geq 0$$

↓

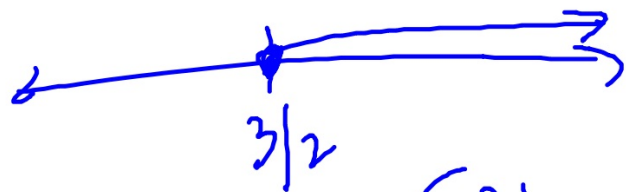
$$4^x = 8$$

$$4^x = 8$$

$$2^{2x} = 2^3$$

$$x = \log_4 8$$

$$x = 3/2$$



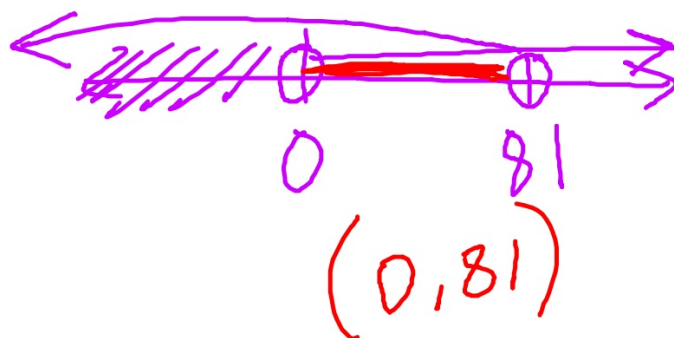
$$\left[\frac{3}{2}, \infty \right)$$

With logs, check the domain first!

$$4) \log_3(x) < 4$$

$$x < 81$$

Domain
 $x > 0$



$$5) \log_4(x+3) \geq \log_4(2x+1)$$

4

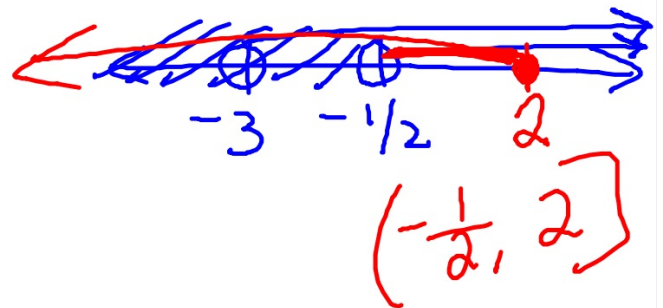
4

$$(x+3) \geq (2x+1)$$

$$2 \geq x$$

$$x+3 > 0$$
$$x > -3$$

$$2x+1 > 0$$
$$x > -\frac{1}{2}$$



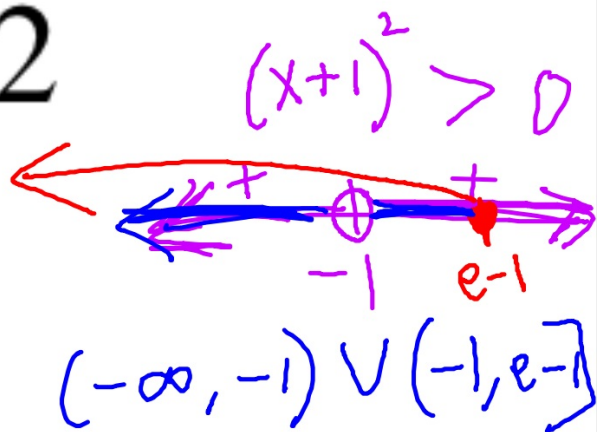
$$7) \ln(x+1)^2 \leq 2$$

$$2 \ln(x+1) \leq 2$$

$$\ln(x+1) \leq 1$$

$$x+1 \leq e$$

$$x \leq e-1$$



$$\textcircled{a} \log_6 x + \log_6 (x - 9) \leq 2$$

$$\log_6 (x(x-9)) \leq 2$$

$$x^2 - 9x \leq 36$$

$$x^2 - 9x - 36 \leq 0$$

$$(x-12)(x+3) \leq 0$$

\downarrow
-3

domain

$$x > 0$$

$$x - 9 > 0$$

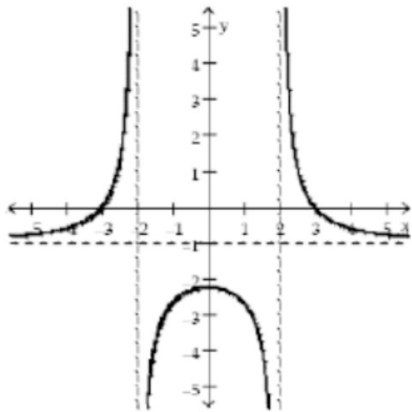
$$x > 9$$



$$(9, 12]$$

Review

Use the graph of $f(x)$ to solve each inequality.



20. $f(x) > 0$

21. $f(x) \leq 0$