

Do Now:

1. Simplify the compound fraction:
$$\frac{\cancel{x-4} \cdot \cancel{x+1}}{x+3 \cdot \cancel{(x-4)} \cdot \cancel{(x+1)}}$$

$$\frac{x^2 - 2x - 3 - (x^2 - 2x - 8)}{(x+3)(x-4)(x+1)}$$

$$\frac{5}{(x+3)(x-4)(x+1)} \quad x \neq 4, -1, -3$$

Classwork

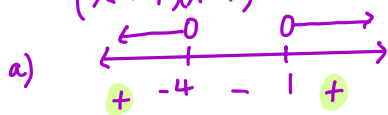
For each inequality below, express its solution set 3 ways:

- (a) Graphically. *(on a number line)*
- (b) Using set-builder notation. *SB*
- (c) Using interval notation. *IN*

1. $4 - 3x - x^2 < 0$

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

"the set of all x's such that..."

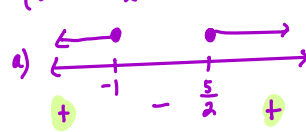
a) 

b) $\{x \mid x < -4 \vee x > 1\}$

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

2. $3(u^2 - u) \geq u^2 + 5$

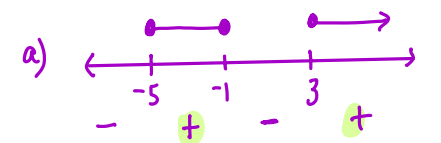
$3u^2 - 3u \geq u^2 + 5$
 $2u^2 - 3u - 5 \geq 0$
 $(2u - 5)(u + 1) \geq 0$

a) 

b) $\{u \mid u \leq -1 \vee u \geq \frac{5}{2}\}$

c) $(-\infty, -1] \cup [\frac{5}{2}, \infty)$

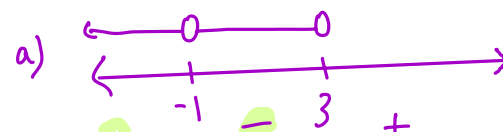
3. $(x+5)(x+1)(x-3) \geq 0$

a) 

b) $\{x \mid -5 \leq x \leq -1 \vee x \geq 3\}$

c) $[-5, -1] \cup [3, \infty)$

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

a) 

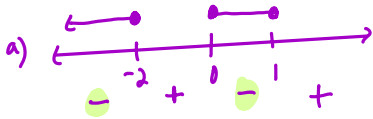
b) $\{x \mid x < -1 \vee -1 < x < 3\}$

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

$$5. z^3 + z^2 - 2z \leq 0$$

$$z(z^2 + z - 2) \leq 0$$

$$z(z+2)(z-1) \leq 0$$



$$b) \{z \mid z \leq -2 \vee 0 \leq z \leq 1\}$$

$$c) (-\infty, -2] \cup [0, 1]$$

$$7. \frac{x}{2} \geq \frac{5}{x+1} + 4$$

$$6. \frac{6}{x-1} - \frac{6}{x} \geq 1$$

$$\frac{x}{x(x-1)} - \frac{6(x-1)}{x(x-1)} - 1 \geq 0$$

$$\frac{6x - 6x + 6 - x^2 + x}{x(x-1)} \geq 0$$

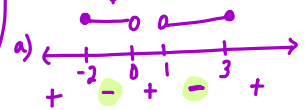
$$-(x^2 - x - 6)$$

$$-x^2 + x + 6$$

$$\frac{-x^2 + x + 6}{x(x-1)} \geq 0$$

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

$$\frac{(x-3)(x+2)}{x(x-1)} \leq 0$$



$$b) \{x \mid -2 \leq x < 0 \vee 1 < x \leq 3\}$$

$$c) [-2, 0) \cup (1, 3]$$

$$8. 1 + \frac{2}{x+1} \leq \frac{2}{x}$$

$$9. \frac{3}{x-1} - \frac{4}{x} \geq 1$$

$$10. -2 < \frac{x+1}{x-3}$$

Homework 09-28

$$\textcircled{1} \frac{x \cdot \cancel{x(x-3)} + 4 \cdot \cancel{x(x-3)}}{x-3} = \frac{1}{3-x} \cdot \cancel{x(x-3)}^{-1}$$

$$\frac{x^2 + 4x - 12}{x^2 - 3x + x}$$

$$x \neq 0, 3$$

$$\frac{x^2 + 4x - 12}{x^2 - 2x}, \quad x \neq 0, 3, 2$$

$$\frac{(x+6)\cancel{(x-2)}}{x\cancel{(x-2)}}$$

$$\frac{x+6}{x}, \quad x \neq 0, 3, 2$$

$$(2) \quad \frac{\frac{4x}{y} + \frac{y^2}{2x^2}}{\frac{1}{y^2} + \frac{1}{2xy}}$$

$$\frac{2x^2y \left(\frac{4x}{y} + \frac{y^2}{2x^2} \right)}{2x^2y \left(\frac{1}{y^2} + \frac{1}{2xy} \right)}$$

$$\frac{8x^3y + y^4}{2x^2 + xy}$$

$$\begin{aligned} x, y &\neq 0 \\ y &\neq -2x \end{aligned}$$

$$\frac{y(8x^3 + y^3)}{x(2x + y)}$$

$$\frac{y(\cancel{2x+y}(4x^2 - 2xy + y^2))}{x(\cancel{2x+y})}$$

$$\frac{y(4x^2 - 2xy + y^2)}{x}$$

$$\begin{aligned}
 & \textcircled{3} \quad \frac{4}{x+2} + \frac{2}{x-4} \\
 & \quad \frac{4 \cdot 2(x-4)(x+2)}{(x+2) \cdot 2(x-4)(x+2)} + \frac{2 \cdot 2(x-4)(x+2)}{2(x-4)(x+2) \cdot (x-4)} \\
 & \quad \frac{8(x-4)(x+2)}{2(x-4)(x+2)} + \frac{4(x+2)}{2(x-4)(x+2)} \\
 & \quad \frac{8x-32+4x+8}{12x-4}
 \end{aligned}$$

$$x \neq -2, 4, \frac{1}{3}$$

$$\frac{8x-32+4x+8}{12x-4}$$

$$\frac{12x-24}{12x-4}$$

$$\frac{3(x-2)}{4(3x-1)}$$

$$\frac{3(x-2)}{3x-1}$$

$$\begin{aligned}
 & \textcircled{4} \quad \frac{x+1}{x-1} - \frac{1-x}{1+x} \\
 & \frac{(x-1)^2(x+1)^2}{(x+1)^2} + \frac{1}{(x-1)^2} (x-1)^2(x+1)^2
 \end{aligned}$$

$$\frac{(x+1)^3(x-1) + (x-1)^3(x+1)}{(x-1)^2 + (x+1)^2}$$

$x \neq \pm 1$

$$\frac{(x+1)(x-1) \left(\frac{(x+1)^2}{(x-1)^2} + \frac{(x-1)^2}{(x+1)^2} \right)}{(x-1)^2 + (x+1)^2}$$

$$\frac{(x+1)(x-1) \left((x+1)(x-1) + 1 + x - 1 \right)}{2x^2 + 2}$$

$$4x(x+1)(x-1)$$

$$2(x^2 + 1)$$

$$(5) \frac{\frac{1}{x^2} - \frac{6}{x} + 9}{x^2(x^2-9)}$$

$$\frac{1-6x+9x^2}{x^2(x-3)(x+3)}$$

$$x^2 \frac{(3x-1)^2}{(x-3)(x+3)} \quad \text{or} \quad x^2 \frac{(1-3x)^2}{(x-3)(x+3)}$$

$$x \neq 0, \pm 3$$

$$\textcircled{6} \quad \frac{\frac{1}{x^3} + \frac{1}{y^3}}{\frac{1}{x^2} + \frac{1}{xy} + \frac{1}{y^2}}$$

$$\frac{y^3 + x^3}{xy^3 - x^2y^2 + x^3y}$$

$$x, y \neq 0$$

$$y^2 - xy + x^2 \neq 0$$

$$\frac{(y+x)(y^2 - xy + x^2)}{xy(y^2 - xy + x^2)}$$

$$\frac{y+x}{xy}$$

$$\textcircled{7} \quad \frac{1}{(a+2x)(y-3)} - \frac{xy+a}{(a+2x)(a-2x)(y-3)^2}$$

$$\frac{\cancel{ay} - 2xy - 3a + 6x - xy - \cancel{ay}}{(a+2x)(a-2x)(y-3)^2}$$

$$\frac{-3xy - 3a + 6x}{(a+2x)(a-2x)(y-3)^2}$$

$$a \neq \pm 2x$$

$$y \neq 3$$

$$\frac{-3(xy+a-2x)}{(a+2x)(a-2x)(y-3)^2}$$

$$\textcircled{8} \quad \frac{7-x-h}{4+x+h} - \frac{7-x}{4+x} = \frac{(7-x-h)(4+x) - (7-x)(4+x+h)}{h(4+x+h)(4+x)}$$

$$\frac{(7-x-h)(4+x) - (7-x)(4+x+h)}{h(4+x+h)(4+x)}$$

$$\frac{\cancel{28} + \cancel{7x} - \cancel{4x} - \cancel{x^2} - 4h - \cancel{xh} - (\cancel{28} + \cancel{7x} + 7h - \cancel{4x} - \cancel{x^2} - \cancel{xh})}{h(4+x+h)(4+x)}$$

$$h \neq 0$$

$$x \neq -4, -h-4$$

$$\frac{-11h}{h(4+x+h)(4+x)}$$

$$\frac{-11}{(4+x+h)(4+x)}$$