

## Do Now

① Simplify and state restrictions:

$$\frac{2a^{-1} + 4b^{-1}}{4ab^{-1} - ba^{-1}}$$

$$a, b \neq 0$$

$$b \neq \pm 2a$$

$$ab \frac{2}{a} + \frac{4}{b} ab$$

$$ab \frac{4a}{b} - \frac{b}{a} ab$$

$$\frac{2b + 4a}{4a^2 - b^2}$$

$$\frac{2(\cancel{b+2a})}{(2a-b)(\cancel{2a+b})} = \frac{2}{2a-b}$$

② Simplify and state restrictions:

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

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

$$x \neq \pm y, -\frac{y}{2}, 2y$$

$$\frac{2x+y}{x-2y}$$

③ Solve and express solution set in set builder notation:

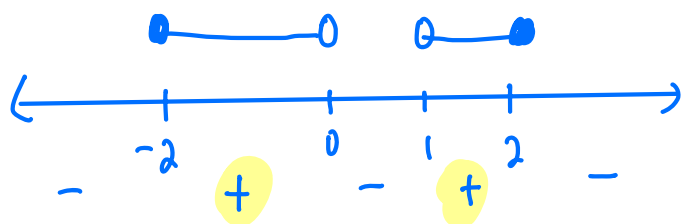
$$\frac{3}{x-1} - \frac{4}{x} \geq 1$$

$$\frac{3}{x-1} - \frac{4(x-1)}{x(x-1)} \geq 0$$

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

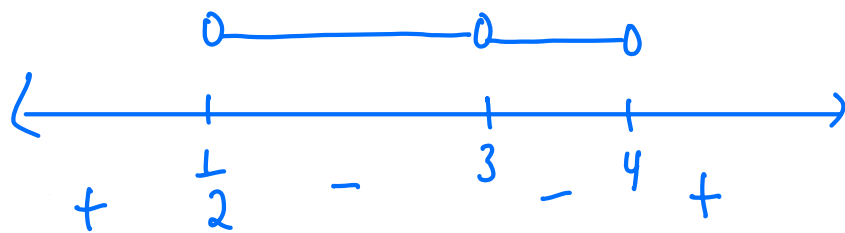
$$\frac{4 - x^2}{x(x-1)} \geq 0$$

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



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

④ Solve:  $\frac{(2x-1)(x-3)^2}{x-4} < 0$



$$\left(\frac{1}{2}, 3\right) \cup (3, 4)$$

⑤ Simplify and state restrictions:

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

(x-1)(x+1)  
(x-1)(x+1)  
(x+1)(x-1)(x+1)

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

$$\frac{x^2 + x + 4}{(x-1)(x+1)^2} \quad x \neq \pm 1$$

⑥ Given  $f(x) = \frac{x+1}{2x+1}$ , find  $\frac{f(x+h) - f(x)}{h}$

$$\frac{\frac{\cancel{(2x+2h+1)}(2x+1)(x+h+1)}{\cancel{(2x+2h+1)}(2x+2h+1)} - \frac{x+1}{\cancel{(2x+1)}(2x+2h+1)}}{h(2x+2h+1)(2x+1)}$$

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

$$\frac{\cancel{2x^2} + x + \cancel{2xh} + h + \cancel{2x} + 1 - (\cancel{2x^2} + \cancel{2xh} + x + \cancel{2x} + 2h + \cancel{x})}{h(2x+2h+1)(2x+1)}$$

$$\frac{-h}{h(2x+2h+1)(2x+1)} = \frac{-1}{(2x+2h+1)(2x+1)} \quad \begin{matrix} x \neq -\frac{1}{2}, -\frac{2h+1}{2} \\ h \neq 0 \end{matrix}$$

⑦ If  $f(x) = 2x^2 - 1$  and  $f(x+y) = 2x^2 + 20x + 49$ ,  
find  $y$

$$f(x+y) = 2(x+y)^2 - 1 = 2(x^2 + 2xy + y^2) - 1$$

$$= 2x^2 + 4xy + 2y^2 - 1$$

$$2x^2 + 4xy + 2y^2 - 1 = 2x^2 + 20x + 49$$

$$4xy = 20x$$

$$y = 5$$

⑧

Perform the indicated operations and give answer in simplest form.

$$\frac{a^2 - b^2}{2a^2 - ab - b^2} \cdot \frac{4a^2 - b^2}{2a^2 + ab - b^2} \div \frac{6a^2 - 5ab + b^2}{3a^2 + 2ab - b^2}$$

$$\frac{(a+b)(a-b)}{(2a+b)(a-b)} \cdot \frac{(2a-b)(2a+b)}{(2a-b)(a+b)} \cdot \frac{(3a-b)(a+b)}{(3a-b)(2a-b)}$$

$$b \neq \pm 2a, \pm a, 3a \quad \frac{a+b}{2a-b}$$

Other questions:  $\frac{x}{x^2-4} - \frac{1}{(2-x)(-1)(x+2)}$

$$\frac{x + x + 2}{(x-2)(x+2)} = \frac{2x+2}{(x-2)(x+2)}$$

$$x \neq \pm 2$$

# Homework 10-11

Name: KEY  
PC: More Piecewise Functions

Date: \_\_\_\_\_

Evaluate the following for  $f(x) = \begin{cases} 3x-5, & x > 4 \\ x^2, & x \leq 4 \end{cases}$ :

1.  $f(7)$

$$3(7) - 5 \\ 16$$

2.  $f(4)$

$$4^2 = 16$$

3.  $f(-3)$

$$(-3)^2 = 9$$

Evaluate the following for  $f(x) = \begin{cases} -2|x+1|, & x \leq 1 \\ 3, & 1 < x < 3 \\ 6-2x, & x \geq 3 \end{cases}$ :

4.  $f(10)$

$$6 - 2(10) \\ -14$$

5.  $f(2)$

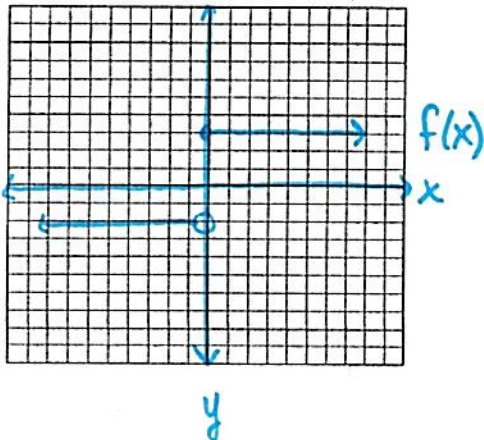
$$3$$

6.  $f(0)$

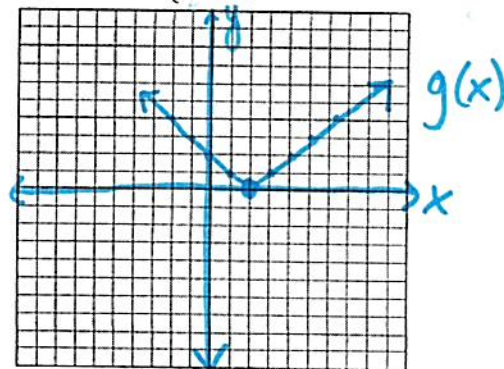
$$-2|0+1| = -2$$

Graph the following piecewise functions.

7.  $f(x) = \begin{cases} -2, & x < 0 \\ 3, & x \geq 0 \end{cases}$

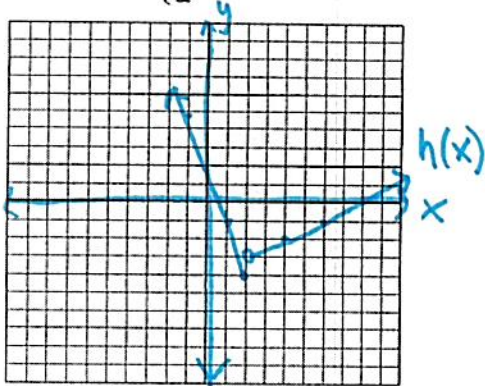


8.  $g(x) = \begin{cases} -x+2, & x < 2 \\ x-2, & x \geq 2 \end{cases}$

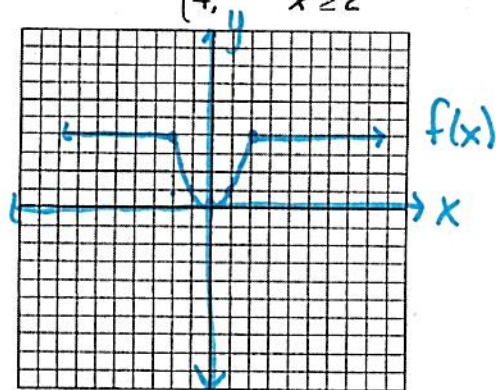




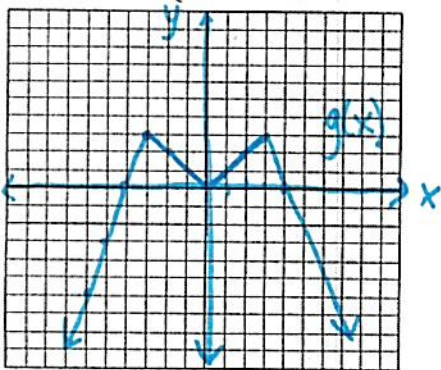
$$9. h(x) = \begin{cases} -3x+2, & x \leq 2 \\ \frac{1}{2}x-4, & x > 2 \end{cases}$$



$$10. f(x) = \begin{cases} 4, & x \leq -2 \\ x^2, & -2 < x < 2 \\ 4, & x \geq 2 \end{cases}$$



$$11. g(x) = \begin{cases} 3x+12, & x \leq -3 \\ |x|, & -3 < x < 3 \\ -3x+12, & x \geq 3 \end{cases}$$



$$12. h(x) = \begin{cases} x^2-4, & x < 3 \\ \frac{2}{3}x-5, & x \geq 3 \end{cases}$$

