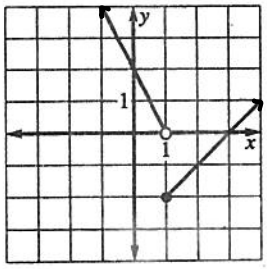
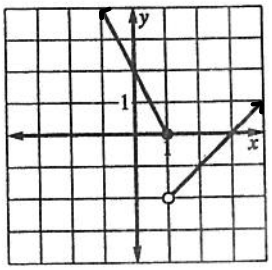
Name:_____ Date:_____
PCH Ms. Loughran

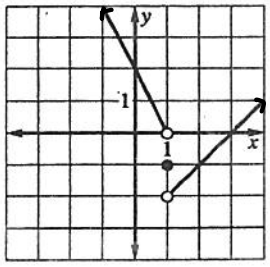
Write equations for the piecewise function whose graph is shown.

1. 

$$f(x)=\begin{cases} -2x+2 & x<1 \\ x-3 & x\geq 1 \end{cases}$$

2. 

$$g(x)=\begin{cases} -2x+2 & x\leq 1 \\ x-3 & x>1 \end{cases}$$

3. 

$$h(x)=\begin{cases} -2x+2 & x<1 \\ -1 & x=1 \\ x-3 & x>1 \end{cases}$$

$f(g(x))$ "f of g of x" $(f \circ g)(x)$ "f follows g of x"

Name: _____ Date: _____

PCH – Composition of Functions – A Quick Review from A2CCH

(1) Let $f(x) = 2x^2$ and $g(x) = x + 3$. Find the following values.

(a) $(f \circ g)(-1)$ $g(-1) = 2$ $f(2) = 2(2)^2 = 8$

(b) $(g \circ f)(-1)$ $f(-1) = 2$ $g(2) = 5$

(c) $(g \circ g)(2)$ $g(2) = 5$ $g(5) = 8$

(2) Suppose $f(1) = 2$, $f(0) = 5$, $g(2) = 6$, $g(3)=7$ and $g(-3) = 0$. Find the following values.

(a) $(f \circ g)(-3)$. $g(-3) = 0$ $f(0) = 5$

(b) $(g \circ f)(1)$. $f(1) = 2$ $g(2) = 6$

$f(x) = 2x$

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

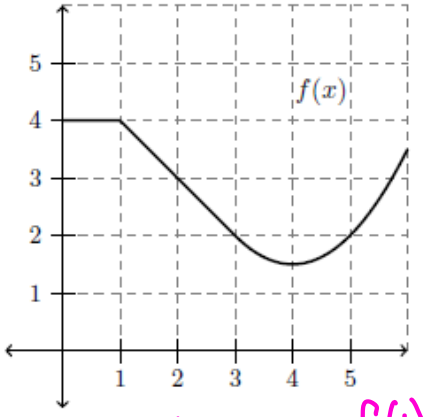
(3) Suppose f is the function that takes a number and doubles it and g is the function that adds 1 to a number and then squares that sum. Find the following values.

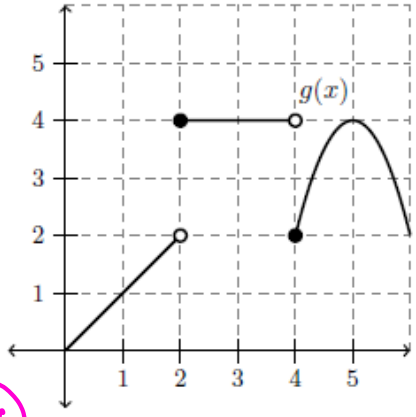
(a) $(f \circ g)(1)$ $g(1) = 4$ $f(4) = 8$

(b) $(g \circ f)(-2)$ $f(-2) = -4$ $g(-4) = 9$

(c) $(f \circ f)(3)$ $f(3) = 6$ $f(6) = 12$

(4) Let $f(x)$ and $g(x)$ be functions defined on [0,5] with the graphs shown below. Use the graphs to evaluate the following.





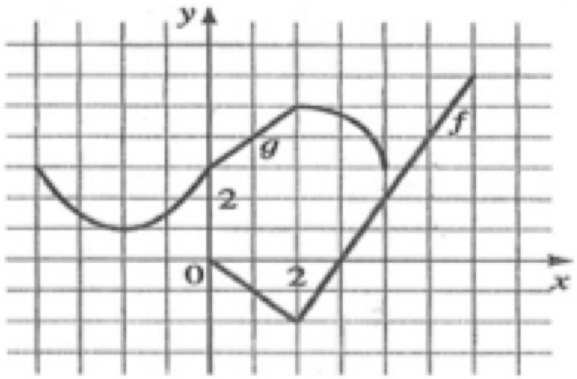
(a) $(f \circ g)(1)$ $g(1) = 1$ $f(1) = 4$

(b) $(f \circ f)(2)$ $f(2) = 3$ $f(3) = 2$

(c) $(g \circ f)(5)$ $f(5) = 2$ $g(2) = 4$

Practice:

For 1-6, use the given graphs of *f* and *g* to evaluate the expression.



1. $f(g(2))$
2. $g(f(0))$
3. $(g \circ f)(4)$
4. $(f \circ g)(4)$
5. $(g \circ g)(-2)$
6. $(f \circ f)(4)$

7. For each of the following, find the functions $(f \circ g)(x)$ and $(g \circ f)(x)$.

(a) $f(x)=2x+3,\ g(x)=4x-1$

$(f \circ g)(x)$
$f(4x-1)$
$2(4x-1)+3$
$8x+1$

$(g \circ f)(x)$
$g(2x+3)$
$4(2x+3)-1$
$8x+11$

(b) $f(x)=6x-5,\ g(x)=\frac{x}{2}$

(c) $f(x)=x^3+2,\ g(x)=\sqrt[3]{x}$

$(f \circ g)(x)$
$f(\sqrt[3]{x})$
$(\sqrt[3]{x})^3+2$
$x+2$

$(g \circ f)(x)$
$g(x^3+2)$
$\sqrt[3]{x^3+2}$

(d) $f(x)=x^2,\ g(x)=\sqrt{x-3}$

(e) $f(x)=x^2,\ g(x)=x-1$

8. Find $f(g(h(x)))$

(a) $f(x)=x-1,\ \ g(x)=\sqrt{x},\ \ h(x)=x+1$

$g(x+1)=\sqrt{x+1}$

$f\left(\sqrt{x+1}\right)=\sqrt{x+1}-1$

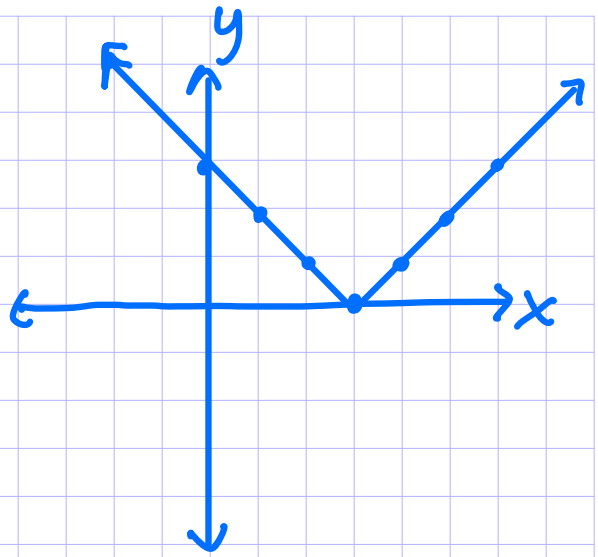
(b) $f(x)=\dfrac{1}{x},\ \ g(x)=x^3,\ \ h(x)=x^2+2$

(c) $f(x)=x^4+1,\ \ g(x)=x-5,\ \ h(x)=\sqrt{x}$

(d) $f(x)=\sqrt{x},\quad g(x)=\dfrac{x}{x-1},\quad h(x)=\sqrt[3]{x}$

Homework 10-25

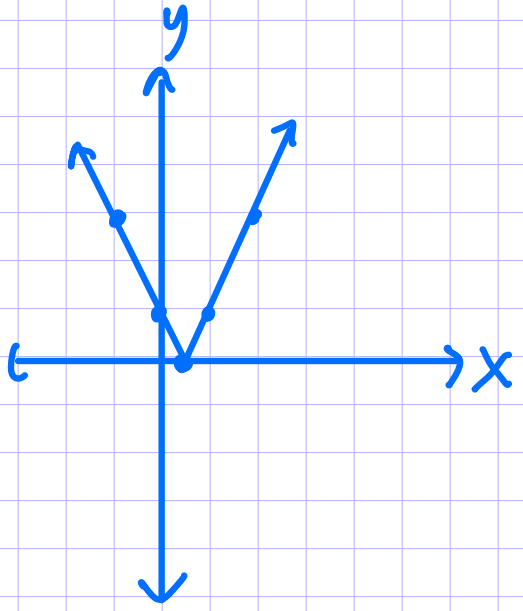
2. $|x-3|=$ $\begin{cases} x-3 & , x \geq 3 \\ -x+3 & x < 3 \end{cases}$



D: $(-\infty, \infty)$

R: $[0, \infty)$

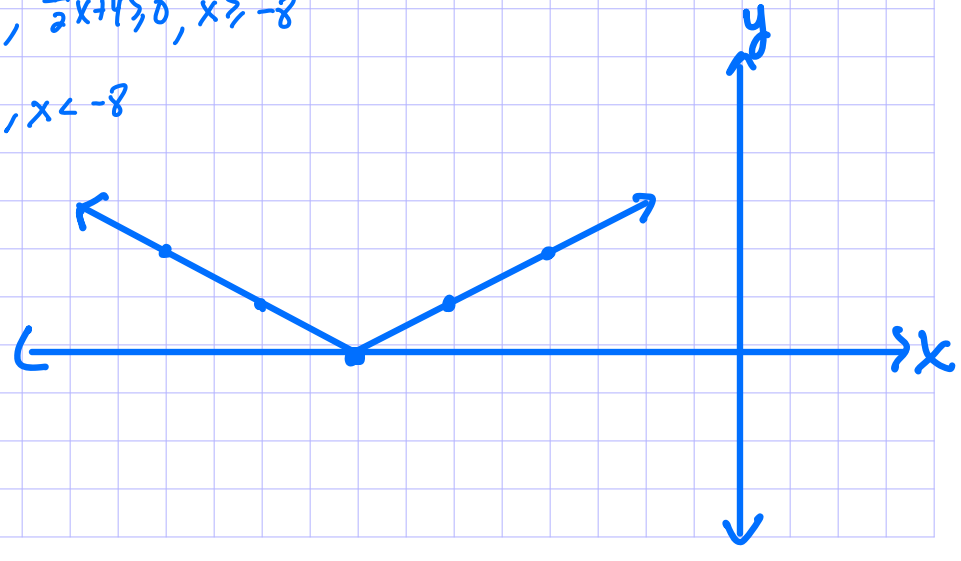
5. $|2x-1|=$ $\begin{cases} 2x-1 & , x \geq \frac{1}{2} \\ -2x+1 & , x < \frac{1}{2} \end{cases}$



D: $(-\infty, \infty)$

R: $[0, \infty)$

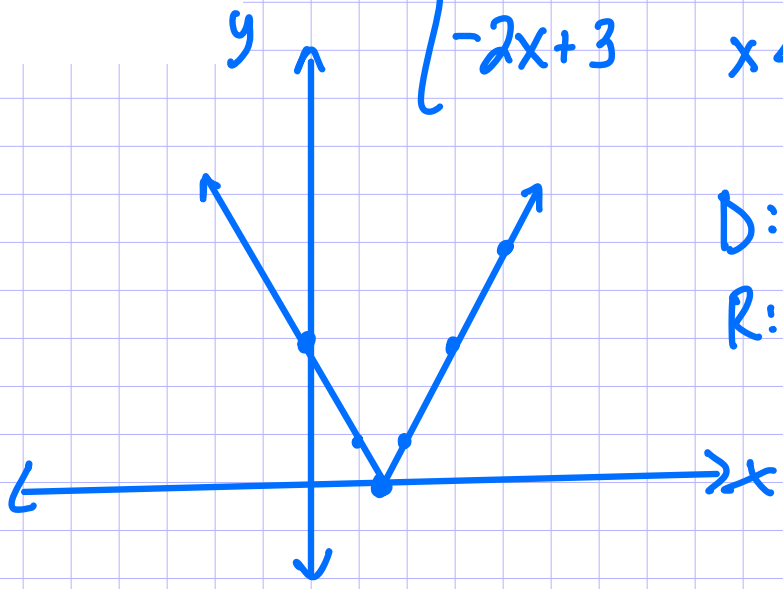
6. $\left|\frac{1}{2}x+4\right|=$ $\begin{cases} \frac{1}{2}x+4 & , \frac{1}{2}x+4 \geq 0, x \geq -8 \\ -\frac{1}{2}x-4 & , x < -8 \end{cases}$



D: $\{x \mid x \in \mathbb{R}\}$

R $\{y \mid y \geq 0\}$

7. $|3-2x|=$ $|2x-3| = \begin{cases} 2x-3, & x \geq \frac{3}{2} \\ -2x+3, & x < \frac{3}{2} \end{cases}$

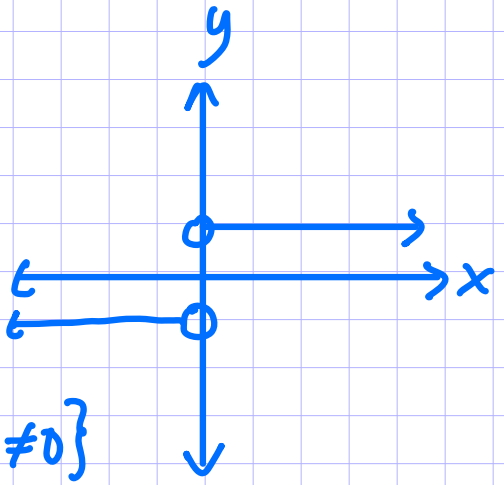


D: $\{x \mid x \in \mathbb{R}\}$

R: $\{y \mid y \geq 0\}$

#8 is on last page

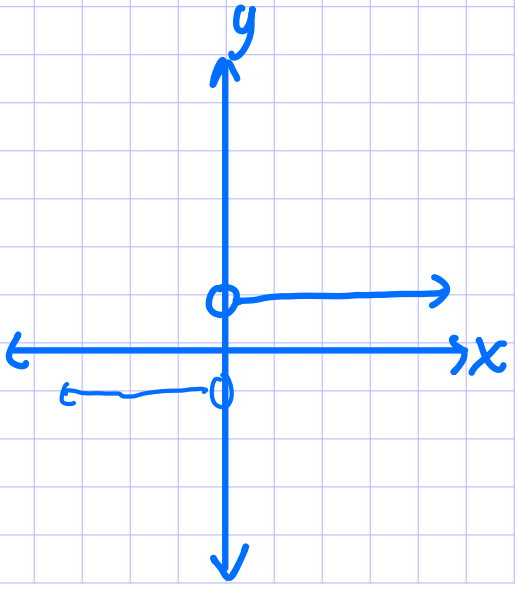
9. $\frac{|x|}{x} = \begin{cases} \frac{x}{x} = 1, & x > 0 \\ \frac{-x}{x} = -1, & x < 0 \end{cases}$



D: $\{x \mid x \in \mathbb{R}, x \neq 0\}$

R: $\{\pm 1\}$

12. $\frac{|2x|}{2x} = \begin{cases} \frac{2x}{2x} = 1, & x > 0 \\ \frac{-2x}{2x} = -1, & x < 0 \end{cases}$

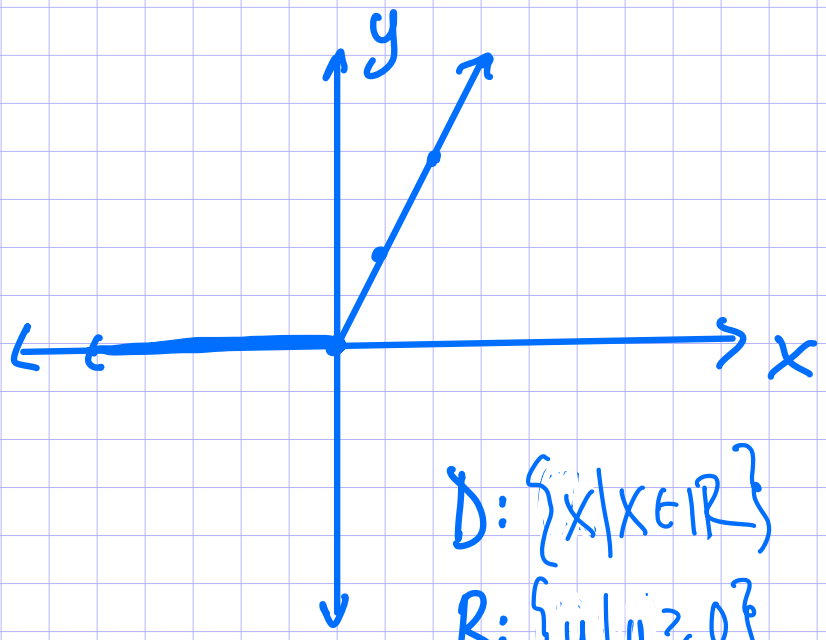


D: $\{x \mid x \in \mathbb{R}, x \neq 0\}$

R: $\{\pm 1\}$

13. $|x|+x=$

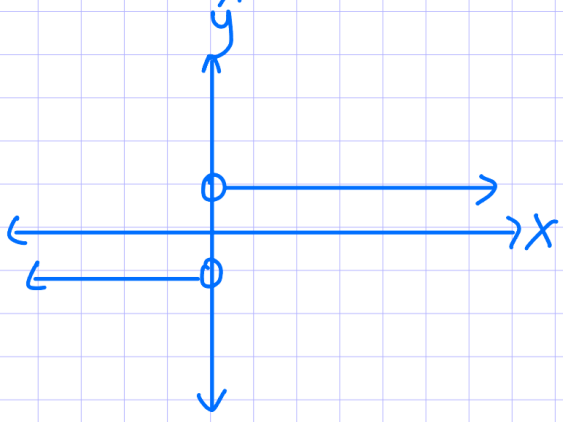
$$\begin{cases} x+x = 2x, & x \geq 0 \\ -x+x = 0, & x<0 \end{cases}$$



D: $\{x \mid x \in \mathbb{R}\}$

R: $\{y \mid y \geq 0\}$

⑧ $\dfrac{x}{|x|} = \begin{cases} \dfrac{x}{x} = 1 & x>0 \\ \dfrac{x}{-x} = -1 & x<0 \end{cases}$



D: $\{x \mid x \in \mathbb{R}/0\}$

R: $\{\pm 1\}$