$y = x^2$

Quadratic

left 5

up 3

vert. stretch by 2

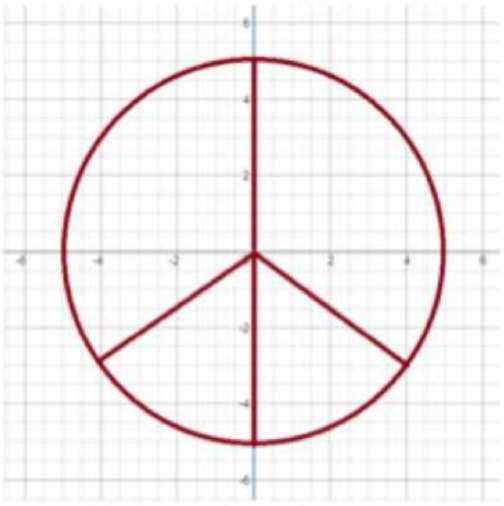
reflect x-axis

$$y = -2(x+5)^2 + 3$$

Piecewise Functions

Peace-wise Function

$$g(x) = \begin{cases} \frac{3}{4}x & \text{if } -4 \le x \le 0 \\ \pm\sqrt{25 - x^2} & \text{if } -5 \le x \le 5 \\ -\frac{3}{4}x & \text{if } 0 \le x \le 4 \\ \text{all real numbers between -5 and 5} & \text{if } x = 0 \end{cases}$$



This is a tremendous function... (even if it fails the vertical line test!)

LanceAF #223 (1-12-16)
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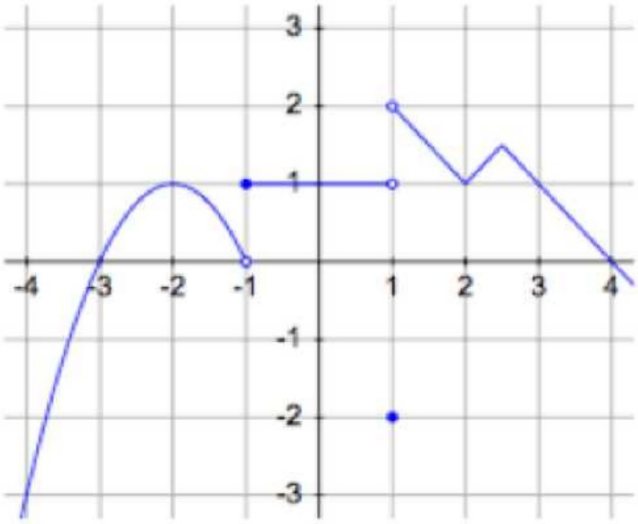
HW:

Piecewise Functions

A piecewise function is a function defined by multiple sub-functions.



ex: Evaluate.

$$f(x)=\begin{cases}8x-1, & x<0\\ -18, & 0\le x<5\\ 3x^{-2}, & x\ge 5\end{cases}$$

a) $f(-3) = -25$

b) $f(6) = 3(6)^{-2} = \frac{1}{12}$

c) $f(0) = -18$

ex: Evaluate.

$$g(x)=\begin{cases}|2x-1|, & x>6\\ \dfrac{1}{x}, & 1<x\le 6\\ x^3, & x=1\end{cases}$$

a) $g\left(\frac{5}{4}\right) = \frac{4}{5}$

b) $g(1) = 1$

c) $g(0)$ undefined

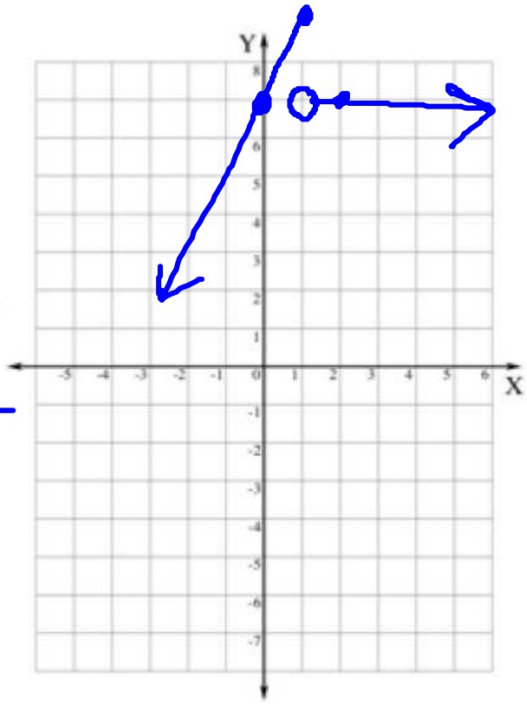
d) $g(10)$ 19

ex: Sketch and state the D/R.

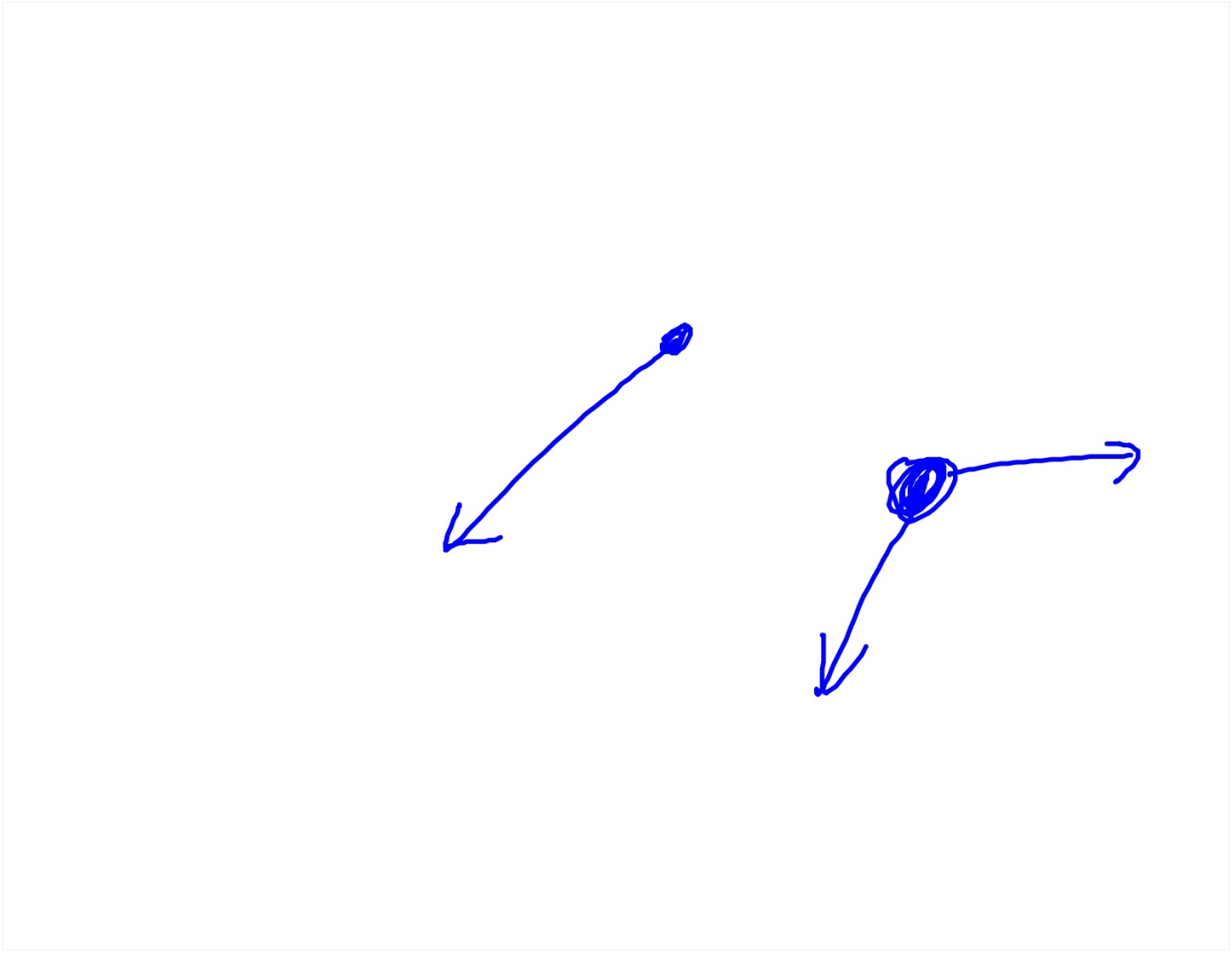
a) $f(x)=\begin{cases}2x+7, & x\le 1\\ 7, & x>1\end{cases}$

$x \le 1$	
x	$2x+7$
1 •	9
0	7

$x > 1$	
x	7
1 ○	7
2	7



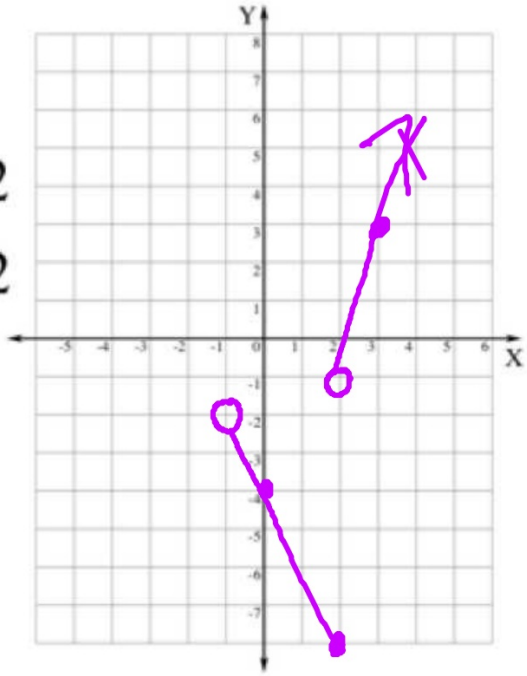
Domain:	Range:
$\{x \mid x \in R\}$	$\{y \mid y \le 9\}$



ex: Sketch and state the D/R.

b)

$$f(x)=\begin{cases}-2x-4, & -1<x\le 2\\ 4x-9, & x>2\end{cases}$$



$-1 < x \le 2$ | $x > 2$

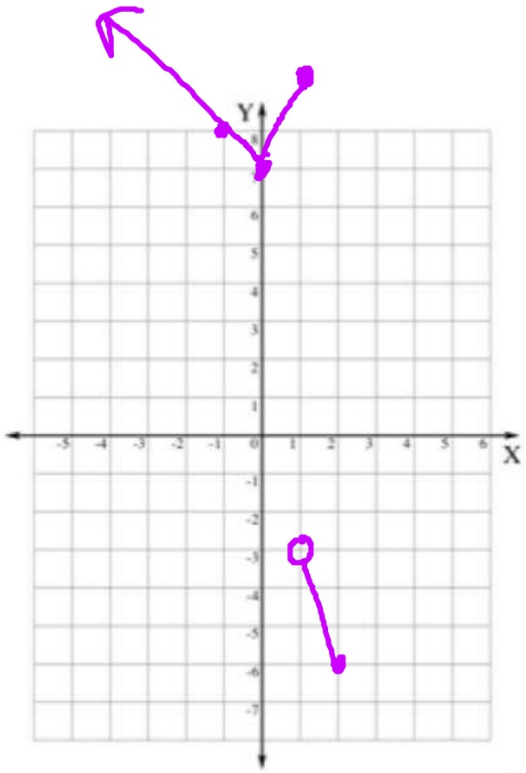
x	$-2x-4$	x	$4x-9$
-1	-2	2	-1
0	-4	3	3
2	-8		

Domain:	Range:
$\{x \mid x > -1\}$	$\{y \mid -9 \le y < -2 \text{ or } y > -1\}$

ex: Sketch and state the D/R.

c)

$$g(x)=\begin{cases}-x+7, & x<0\\ 2x+7, & 0\le x\le 1\\ -3x, & 1<x\le 2\end{cases}$$

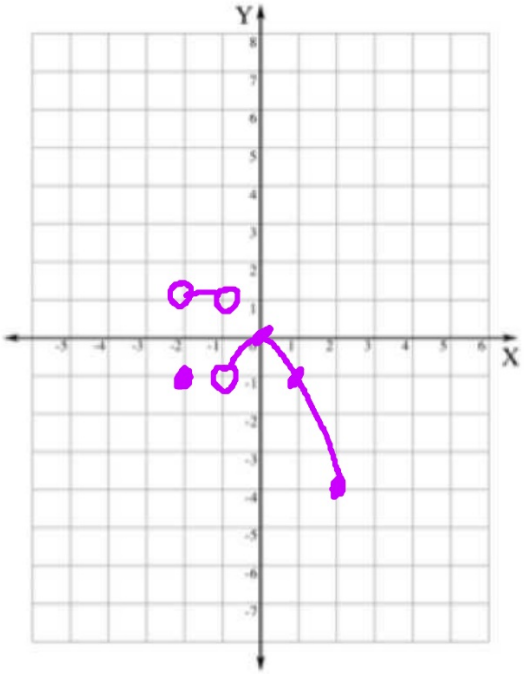


Domain: $(-\infty, 2]$	Range: $[-7, \infty) \cup [-6, -3)$

ex: Sketch and state the D/R.

d)
$$y = \begin{cases} \dfrac{2}{x}, & x = -2 \\ 1, & -2 < x < -1 \\ -x^2, & -1 < x \leq 2 \end{cases}$$

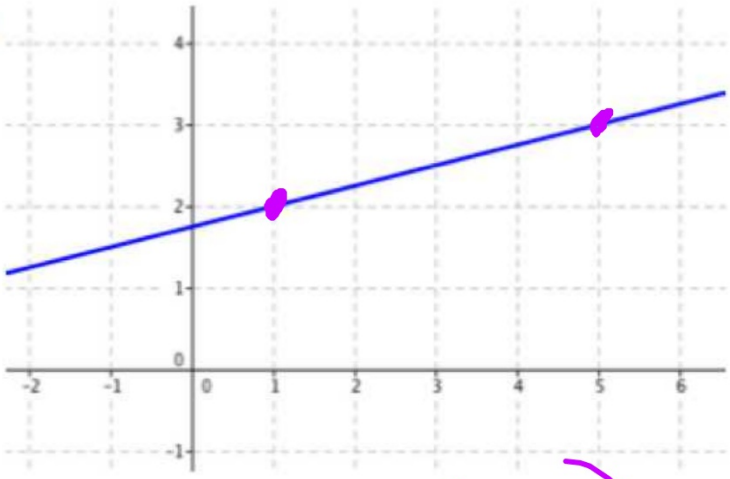
x	$-x^2$
-1	-1
0	0
1	-1
2	-4



Domain:	Range:
$[-2,-1) \cup (-1,2]$	$[-4,0] \cup [1]$

ex: Write the equation.

a)



$y - y_1 = m(x - x_1)$

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

$y = \frac{1}{4}x + \frac{7}{4}$

$m = \frac{1}{4}$

$(1, 2)$

$y = mx + b$

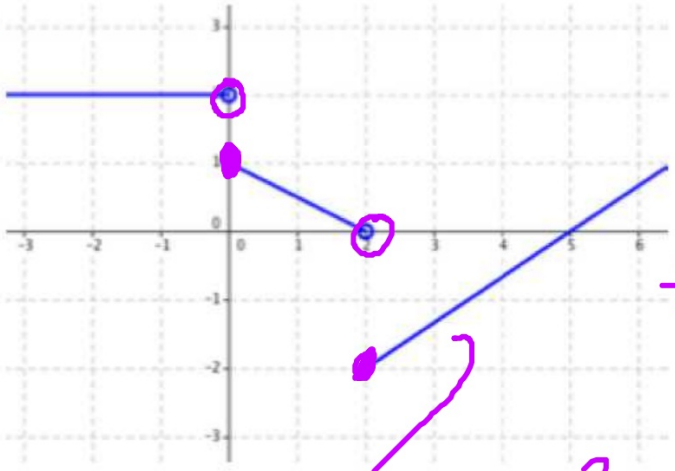
$2 = \frac{1}{4}(1) + b$

$\frac{7}{4} = b$

$y = \frac{1}{4}x + \frac{7}{4}$

ex: Write the equation.

b)



$m = \frac{2}{3}$

$(5, 0)$

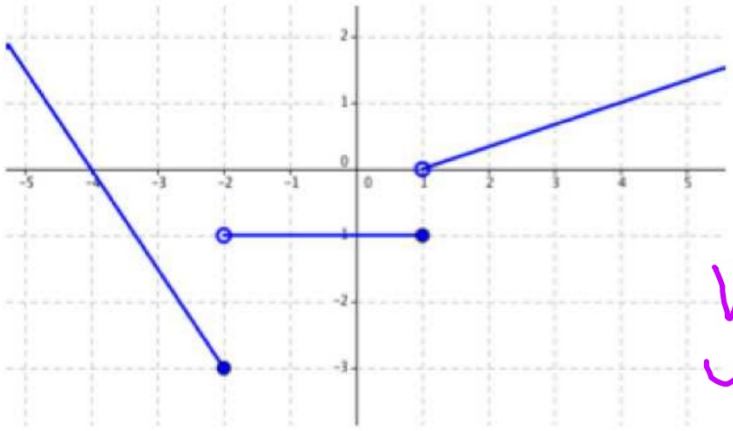
$0 = \frac{2}{3}(5) + b$

$-\frac{10}{3} = b$

$$f(x) = \begin{cases} 2 & , x < 0 \\ -\frac{1}{2}x + 1 & , 0 \le x < 2 \\ \frac{2}{3}x - \frac{10}{3} & , x \ge 2 \end{cases}$$

ex: Write the equation.

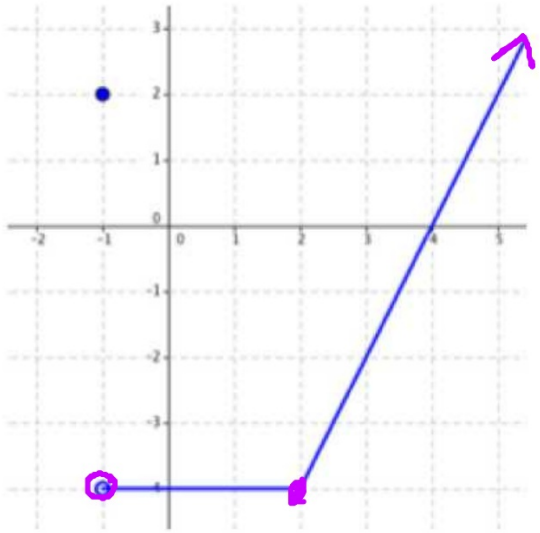
c)



$$y = \begin{cases} -\frac{3}{2}x - 6, & x \leq -2 \\ -1, & -2 < x \leq 1 \\ \frac{1}{3}x - \frac{1}{3}, & x > 1 \end{cases}$$

ex: Write the equation.

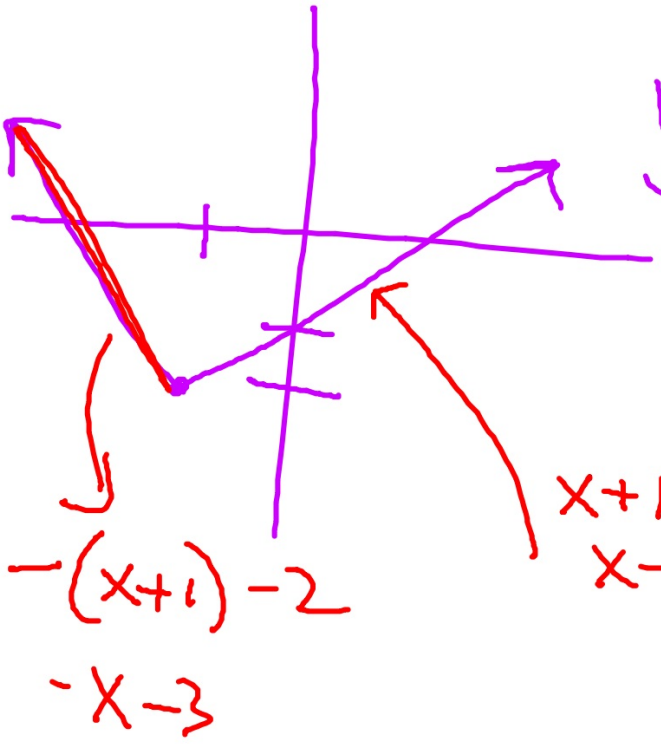
d)



$$f(x) = \begin{cases} 2, & x = -1 \\ -4, & -1 < x \leq 2 \\ 2x - 8, & x > 2 \end{cases}$$

ex: Rewrite as a piecewise function.

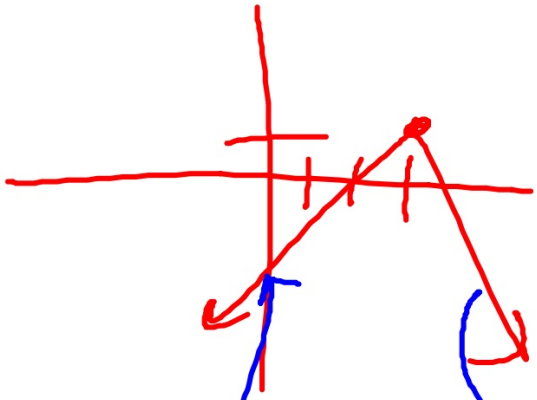
a) $y = |x+1| - 2$



$$y = \begin{cases} -x-3, & x < -1 \\ x-1, & x \geq -1 \end{cases}$$

ex: Rewrite as a piecewise function.

b) $y = -3|5x - 2| + 4$ $-2|x-3|+1$



$y = \begin{cases} 2x-5, & x<3 \\ -2x+7, & x \geq 3 \end{cases}$

$2(x-3)+1$

$2x-5$

$-2(x-3)+1$

$-2x+7$