Piecewise Functions

DAY 4

Piecewise-defined Functions – A function that is defined in different ways for different parts of its domain.

Step 1. Graph the boundary line.
Step 2. Graph equation 1 (only over the correct domain).
Step 3. Graph equation 2 (only over the correct domain).
Step 4. Check that: The graph is a function!
There is an open circle where it should be!

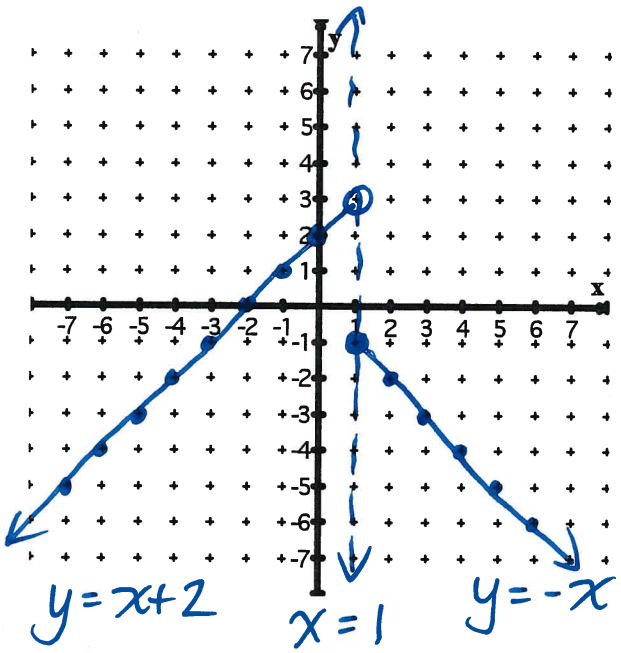
1. This is an example of a piecewise function:

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

(1, 3) ○
(1, -1) ●

1	$y = x+2$	$x < 1$
2	$y = -x$	$x \geq 1$

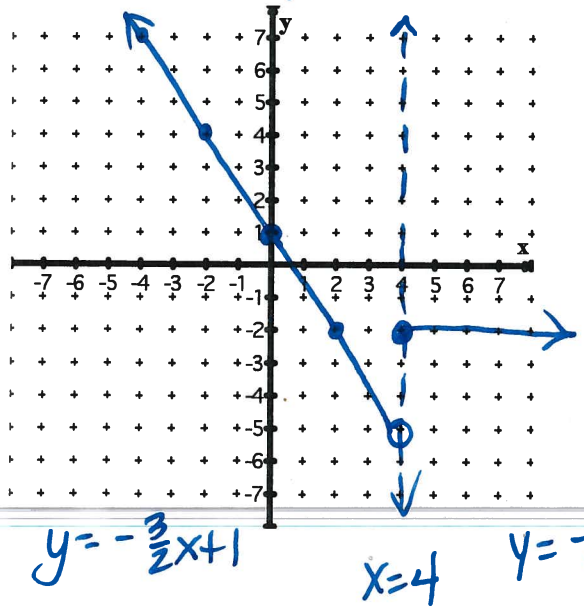
$x = 1$



YOU TRY → Graph the piecewise functions

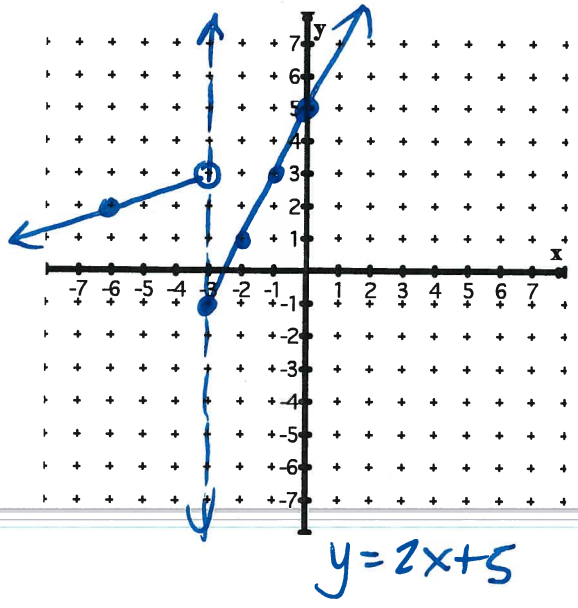
2. $$h(x) = \begin{cases} -\frac{3}{2}x + 1; & x < 4 \\ -2; & x \geq 4 \end{cases}$$

(4, -5) ○
(4, -2) ●
$x = 4$



3. $$g(x) = \begin{cases} 2x + 5; & x \geq -3 \\ \frac{1}{3}x + 4; & x < -3 \end{cases}$$

(-3, -1) ●
(-3, 3) ○
$x = -3$



Ex. 1) Evaluate the function at the given values: $f(x)=\begin{cases}4x-3, & \text{if } x>3 \\ 5x+2, & \text{if } x\le 3\end{cases}$ ① ②

a. $f(-2)$ $-2\le 3$ ②

$f(-2)=5(-2)+2$

$=-10+2$

$=\boxed{-8}$

b. $f(3)$ $3\le 3$ ②

$f(3)=5(3)+2$

$=15+2$

$=\boxed{17}$

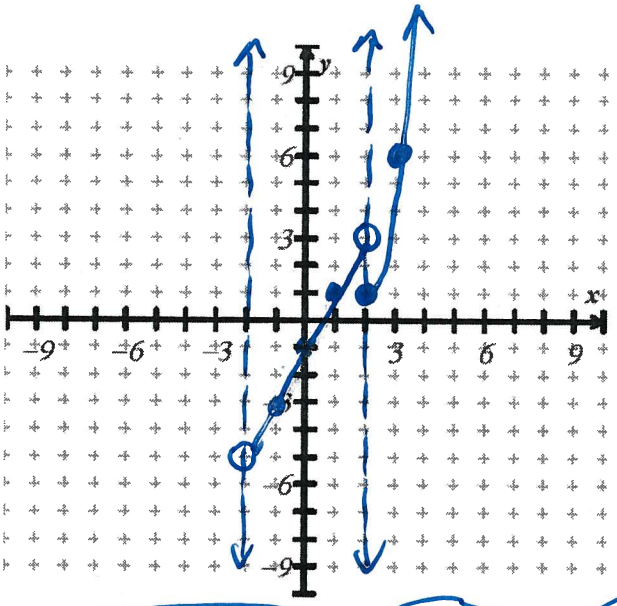
c. $f(5)$ $5>3$ ①

$f(5)=4(5)-3$

$=20-3$

$=\boxed{17}$

Ex. 5): Graph $f(x)=\begin{cases}2x-1, & -2<x<2 \\ 1, & x=2 \\ x^2-3, & x>2\end{cases}$ ① ② ③



a. Find $f(-1)$. -3

$f(-1)=2(-1)-1$

$-2<-1<2$ ①

b. Find $f(2)$. 1

$x=2$ ②

c. Find $f(3)$. 6

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

$3>2$ ③

d. Find the domain of the function. $(-2,\infty)$

e. Find the range of the function. $(-5,\infty)$

$-2<x<2$

x	y
-2	-5
2	3

Linear

$x=2$

x	y
2	1

$x>2$

x	y
2	1
3	6
4	13

Quadratic

Ex. 6) Write the piecewise function given by the graph.

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