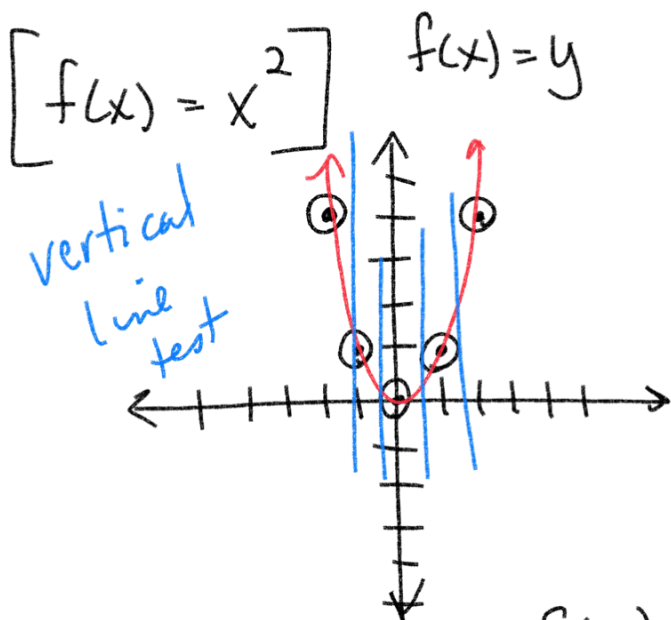
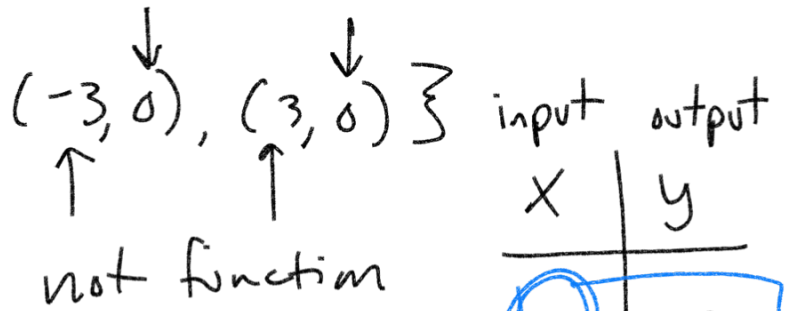
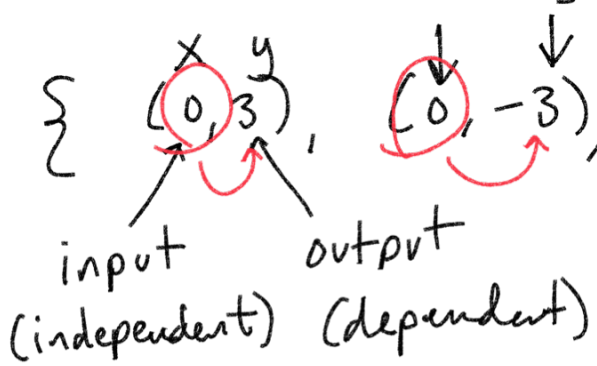


Functions → mathematical relationships

input → output

For a function, one input must generate one, and only one, output.



input	output
x	y
-2	4
-1	1
0	0
1	1
2	4

$\{y = \pm\sqrt{x}\}$

problem

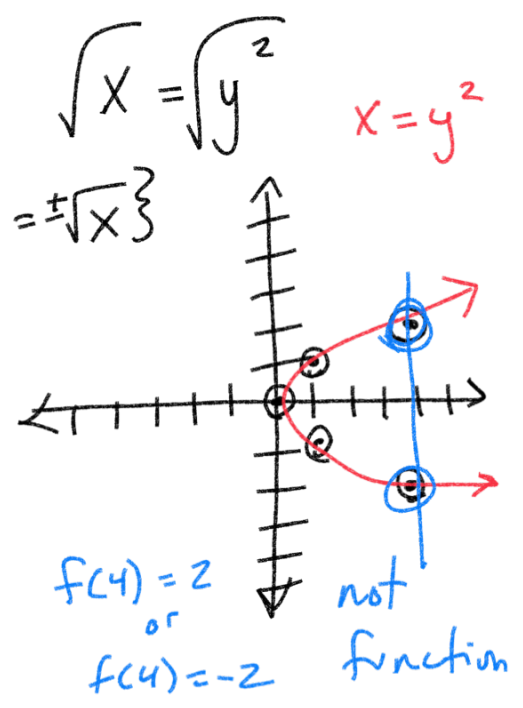
input	output
x	y
0	3
0	-3
-3	0
3	0

fine

$f(-2) = (-2)^2 = 4$   
 $f(-1) = (-1)^2 = 1$

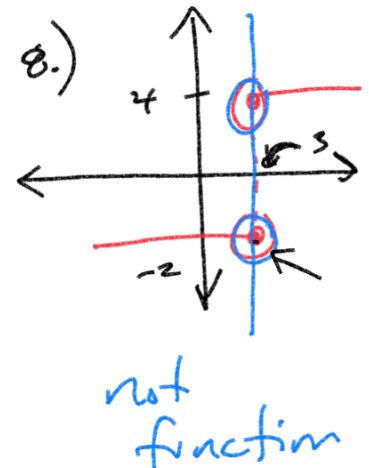
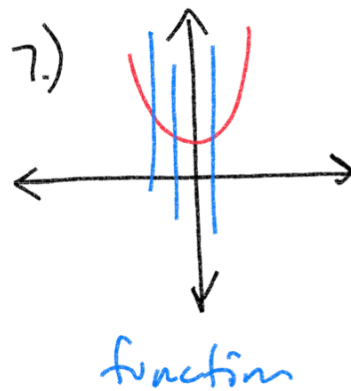
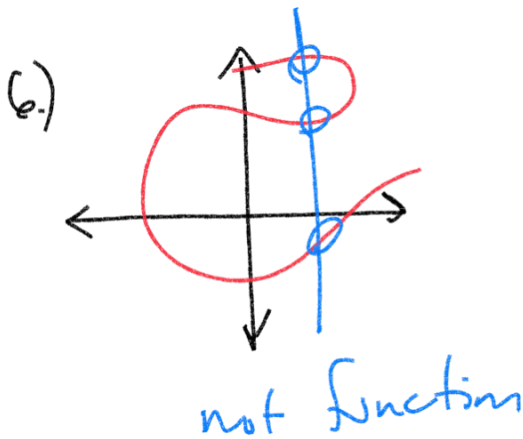
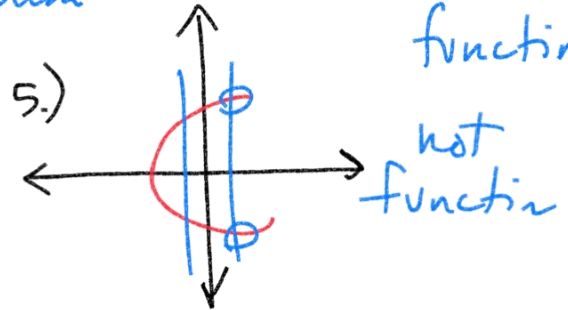
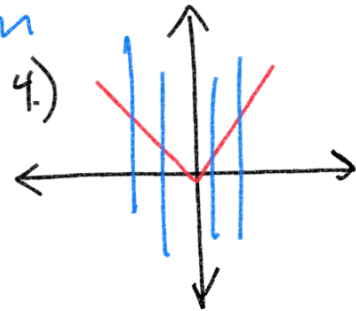
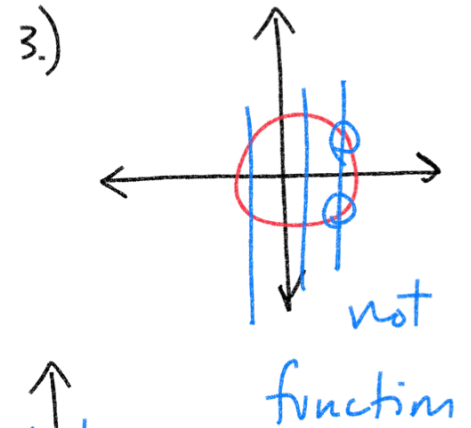
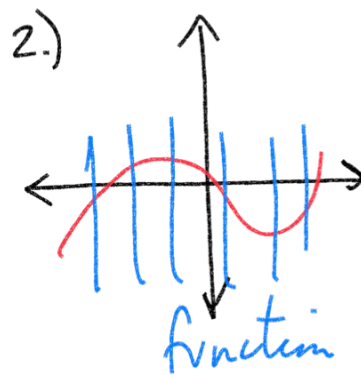
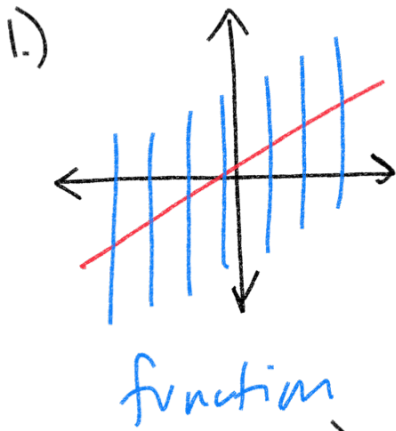
$f(-2) \rightarrow 4$   
 $f(2) \rightarrow 4$

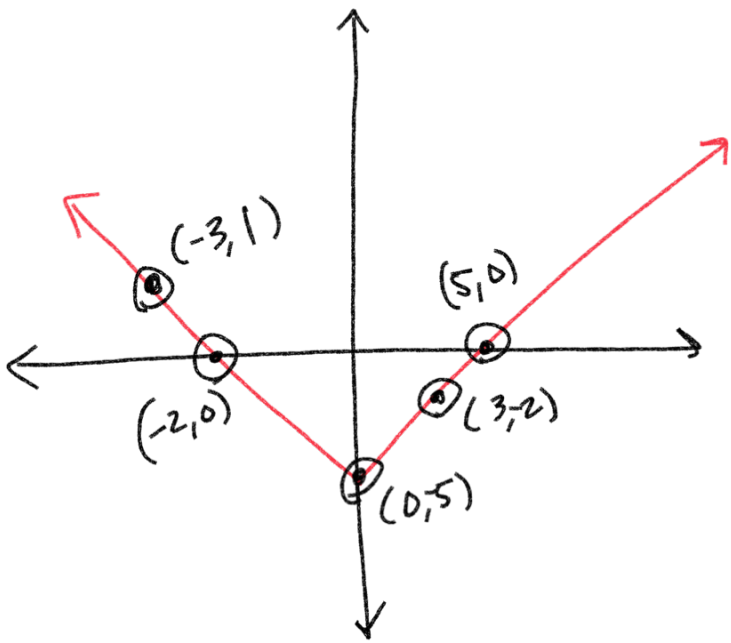
x	y
4	2, -2
1	1, -1
0	0
-1	1
-4	2i



1.)  $(0,0)$ ,  $(-1,-1)$ ,  $(-2,-8)$ ,  $(1,1)$ ,  $(2,8)$   
function

2.)  $(2,-2)$ ,  $(2,2)$ ,  $(5,-5)$ ,  $(5,5)$





$$f(x) = y$$

$$f(-3) = 1$$

$$f(0) = -5$$

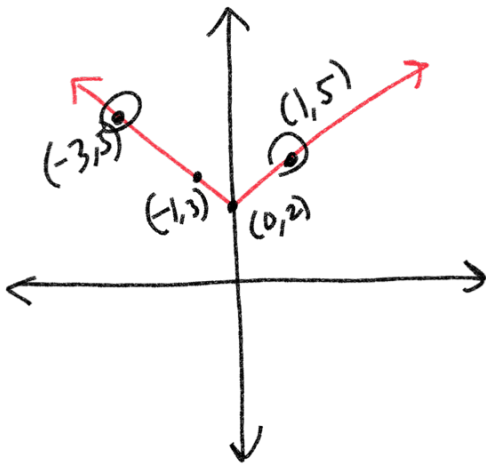
$$f(3) = -2$$

$$f(5) = 0$$

$$\begin{cases} f(x) = 0 & y = 0 \\ x = 5, -2 \end{cases}$$

$$f(\underbrace{f(5)}) = -5$$

$$f(0) = -5$$



$$1.) f(-1) = 3$$

$$2.) f(0) = 2$$

$$3.) f(1) = 5$$

$$\begin{cases} 4.) f(x) = 5 \leftarrow y = 5 \\ x = 1, -3 \end{cases}$$

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

$$g(x) = 4 - x^2$$

1.)  $f(-2) = 2(-2) - 3$        $f(-2) = -7$        $(-2, -7)$   
 $-4 - 3 = -7$

2.)  $f(3) + g(1)$        $g(x) = 4 - x^2$   
 $2(3) - 3 + 4 - (1)^2$   
 $6 - 3 + 4 - 1$   
 $3 + 3 = 6$

3.)  $\frac{f(8)}{g(6)} = \frac{2(8) - 3}{4 - (6)^2} = \frac{16 - 3}{4 - 36} = \frac{13}{-32} = -\frac{13}{32}$

$$\frac{f(x)}{g(x)}$$

what is the restriction  
 $g(x) \neq 0$

$$4 - x^2 \neq 0$$

$$-x^2 \neq -4$$

$$\sqrt{x^2} \neq \sqrt{4}$$

$$x \neq \pm 2$$

4.)  $f(x) + g(x)$   
 $2x - 3 + 4 - x^2 = -x^2 + 2x + 1$

$$f(x) = \boxed{2x-3}$$

$$g(x) = \boxed{4-x^2}$$

→  $f(g(x))$

$$2(4-x^2) - 3$$

$$8 - 2x^2 - 3 =$$

$$\boxed{-2x^2 + 5}$$

outer →  $g(f(x))$

$$4 - (2x-3)^2$$

$$4 - (2x-3)(2x-3)$$

$$4 - (4x^2 - 6x - 6x + 9)$$

$$4 - (4x^2 - 12x + 9)$$

$$4 - 4x^2 + 12x - 9$$

$$\boxed{-4x^2 + 12x - 5}$$