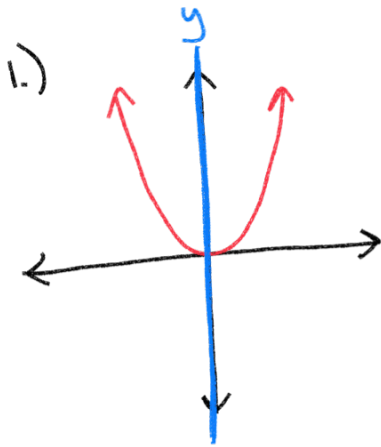
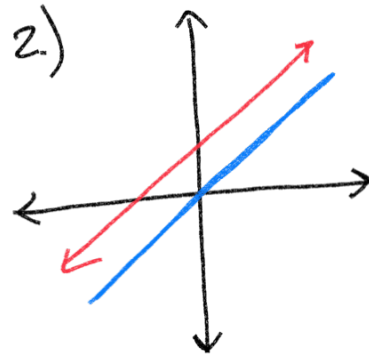


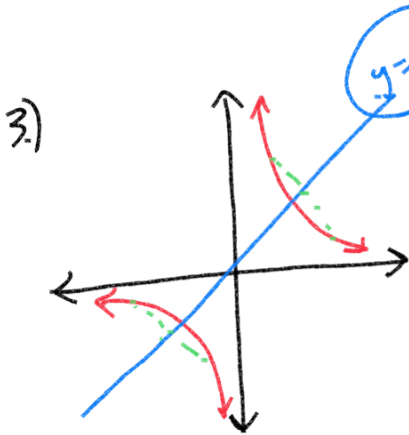
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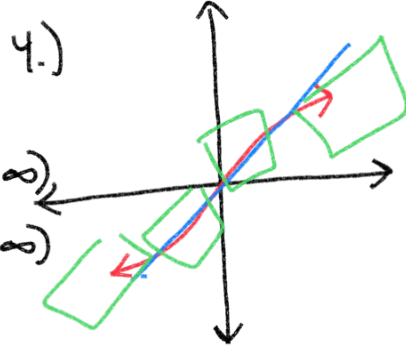
1.)  
 Name: Square  
 Func:  $f(x) = x^2$   
 Dom:  $(-\infty, \infty) \mathbb{R}$   
 Range:  $[0, \infty)$   
 Even/Odd/Neither



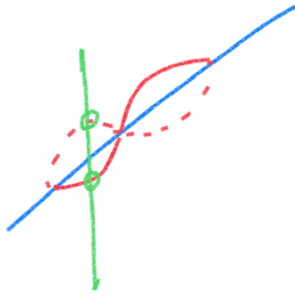
2.)  
 Name: Linear  
 Func:  $f(x) = mx + b$   
 Dom:  $(-\infty, \infty)$   
 Range:  $(-\infty, \infty)$   
 Even/Odd/Neither



3.)  
 Name: Inverse  
 Func:  $f(x) = \frac{1}{x}$   
 Dom:  $(-\infty, 0) \cup (0, \infty)$   
 Range:  $(-\infty, 0) \cup (0, \infty)$   
 Even/Odd/Neither



4.)  
 Name: Cube root  
 Func:  $f(x) = \sqrt[3]{x}$   
 Dom:  $(-\infty, \infty)$   
 Range:  $(-\infty, \infty)$   
 Even/Odd/Neither



odd function

$$f(-x) = -f(x)$$

$$f(x) = \sqrt[3]{x} \quad f(8) = \sqrt[3]{8} = 2$$

$$f(-8) = -f(8)$$

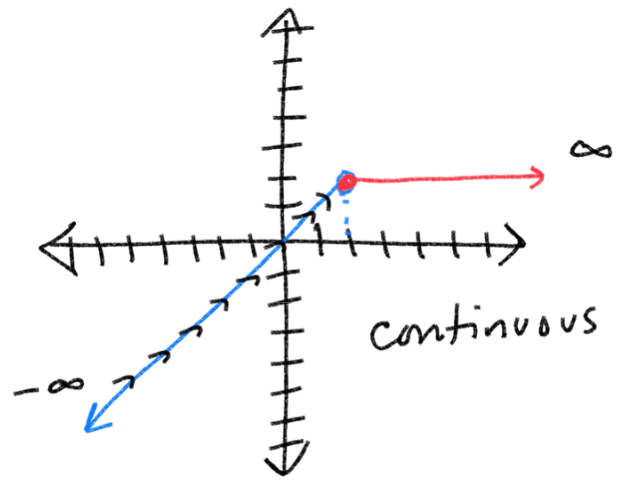
$$f(-8) = \sqrt[3]{-8} = -2$$

# Piece-wise Function

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

$$f(x) = x$$

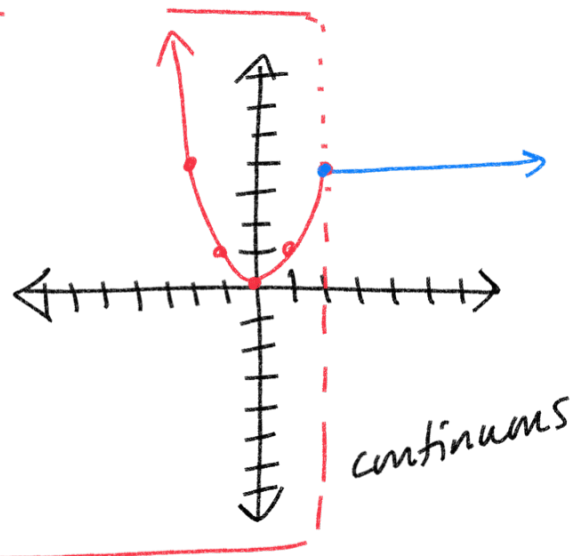
$$f(x) = 2$$



$$f(x) = \begin{cases} x^2 & x < 2 \\ 4 & x \geq 2 \end{cases}$$

$$f(x) = x^2$$

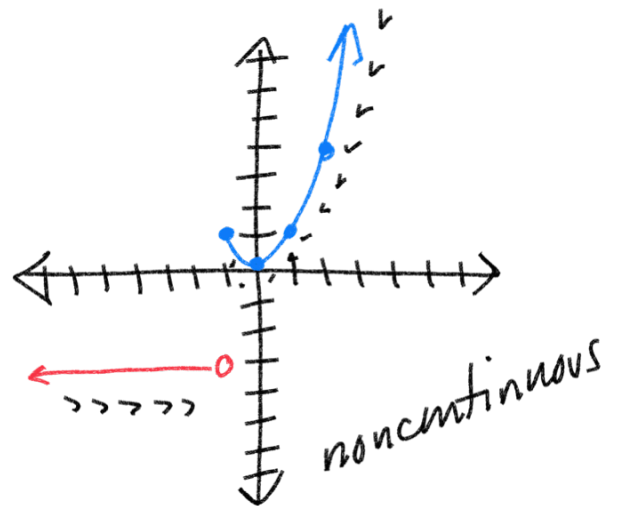
$$f(x) = 4$$



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

$$f(x) = -3$$

$$f(x) = x^2$$



$$f(-1) = (-1)^2 = 1 \quad (-1, 1)$$

$$f(0) = (0)^2 = 0$$

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

$$\lim_{x \rightarrow -1^-} f(x) = -3$$

$$x \rightarrow -1^-$$

$$\lim_{x \rightarrow -1^+} f(x) = 1$$

$$x \rightarrow -1^+$$

$f(x) = x^2$   
parent function

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

$f(x) = x^2 + 3$

$f(x) = 3x^2$

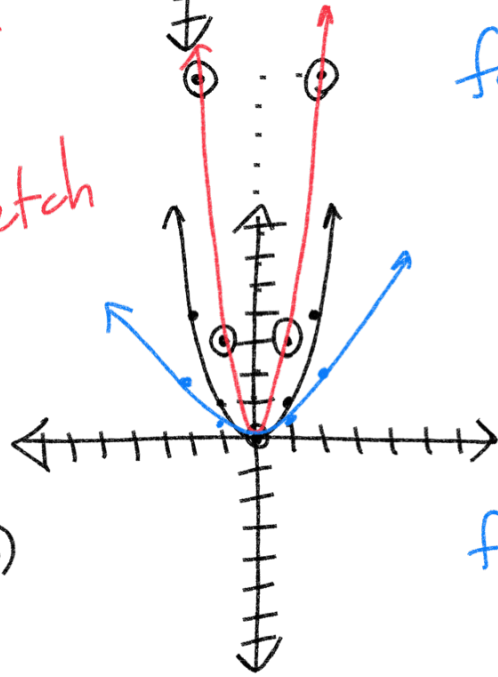
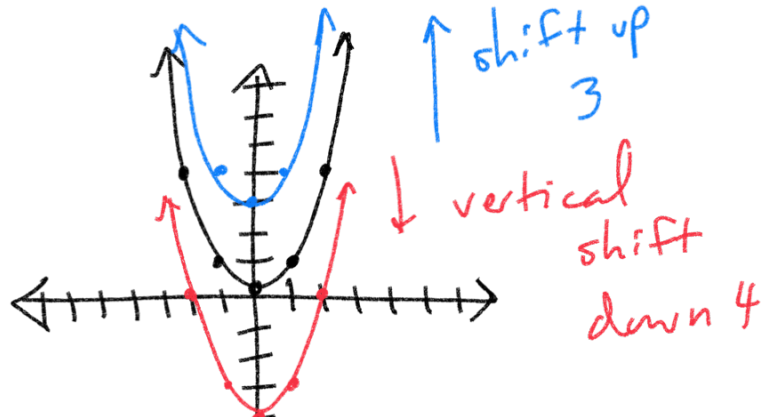
$f(x) = ax^2$

$a > 1$   
stretch

$f(x) = ax^2$

$a < 1$   
compressed

$f(x) = \frac{1}{2}x^2$   
compressed

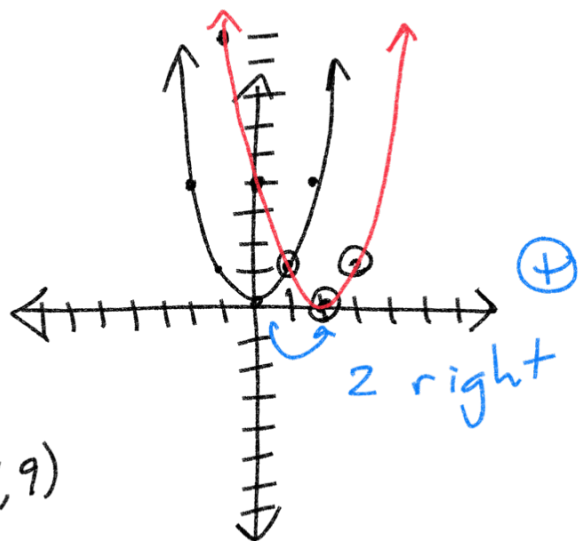


x	$f(x) = 3x^2$	$(-2, 12)$
-2	$3(-2)^2 = 3(4) = 12$	
-1	$3(-1)^2 = 3(1) = 3$	$(-1, 3)$
0	$3(0)^2 = 0$	$(0, 0)$
1	$3(1)^2 = 3$	$(1, 3)$
2	$3(2)^2 = 12$	$(2, 12)$

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

↑ opposite

x	$(x-2)^2$
-2	$(-2-2)^2 = (-4)^2 = 16$
-1	$(-1-2)^2 = (-3)^2 = 9$ (-1, 9)
0	$(0-2)^2 = (-2)^2 = 4$ (0, 4)
1	$(1-2)^2 = (-1)^2 = 1$ (1, 1)
2	$(2-2)^2 = (0)^2 = 0$ (2, 0)
3	$(3-2)^2 = (1)^2 = 1$ (3, 1)



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

↑                    ↑  
2, -3

$$(x-1)^2 + (y+4)^2 = 9$$

(1, -4)

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

stretch (green arrow pointing to 2)  
left 3 (blue arrow pointing to +3)  
down 5 (red arrow pointing to -5)

