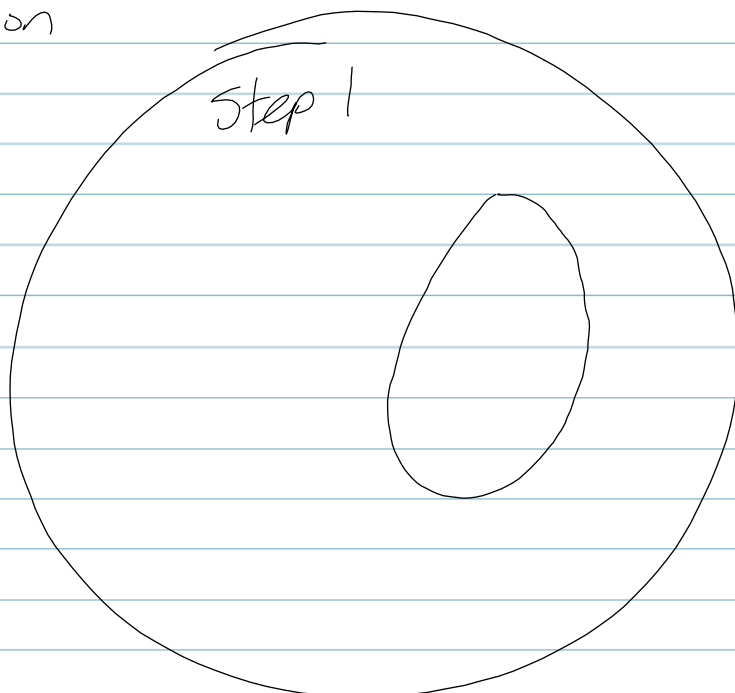


3.2 Functions

Relation



$\{(1, 2), (2, 3), (3, 5)\}$
 $(1, 4)$

relation - a set of ordered pairs

domain - set of input values - first component (x)

range - set of output values - second component (y)

function - a relation in which the 1st component in the ordered pair corresponds to exactly one 2nd component.

one input leads to only one output.

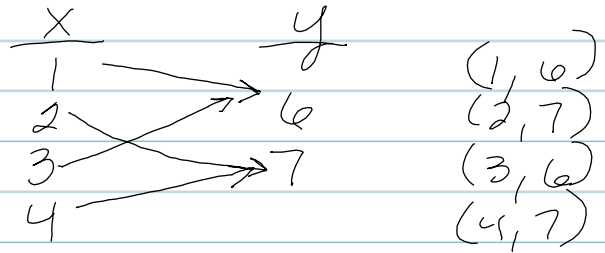
$\{(1,2), (2,-1), (3,-1)\}$

function: yes!

domain: $\{1, 2, 3\}$
(x)

range: $\{2, 4\}$
(y)

mapping



function - yes!

domain $\{1, 2, 3, 4\}$

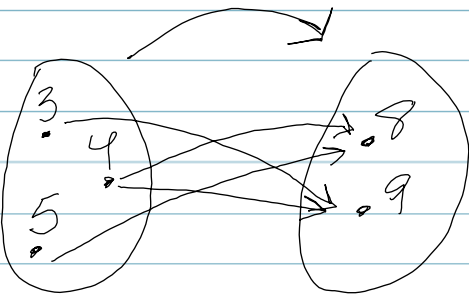
range $\{6, 7\}$

year super bowl winner
 team

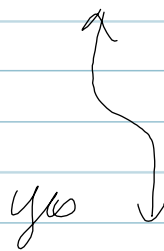
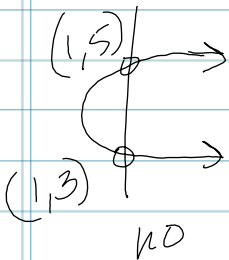
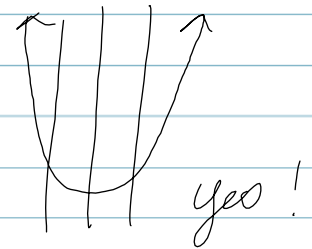
2000 → Cowboys

2001 → Rams

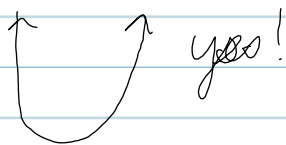
2002 → Patriots



$(3, 9)$
 $(4, 8)$
 $(4, 9)$
 $(5, 8)$



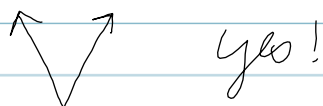
$$y = x^2 - 3x + 4$$



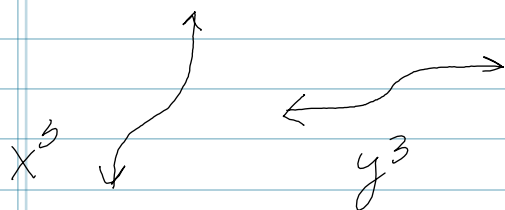
$$y = x^2$$

$$x = \sqrt{y^2}$$

$$y = |x - 4| + 8$$



$$x = |y - 4| + 8$$



$$x^2 + y^2 = 4$$

$$y = \pm \sqrt{x^2 - 4}$$

$$y = 2(x - 1)^2 + 3$$

shape

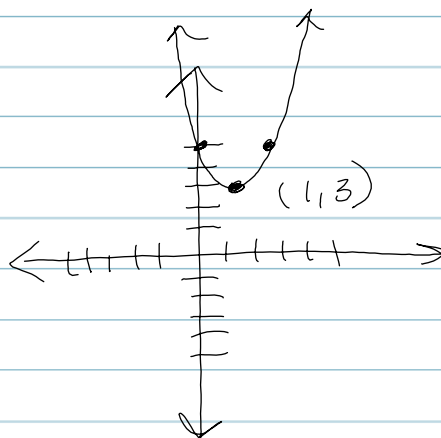
$$\begin{aligned} &2(0 - 1)^2 + 3 \\ &2(1) + 3 \\ &5 \end{aligned}$$

$$\begin{aligned} D: &(-\infty, \infty) \\ R: &[3, \infty) \\ &y \geq 3 \end{aligned}$$

$$(h, k) = (1, 3)$$

$a = 2$ + up
2 stretched
(narrow)

x	y
-1	5
0	5
1	3
2	5
3	



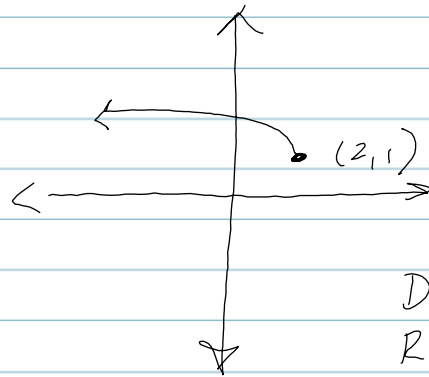
$$y = \sqrt{2-x} + 1$$

↙
 $(h, k) (2, 1)$

$$a = 1 + \text{up}$$

1 neutral

$-x \Rightarrow$ left



$$D: (-\infty, 2]$$
$$R: [1, \infty)$$

3.1
3.2
3.6

$$y = -(x-1)^3 + 4$$

↙
 $(1, 4)$ $D: (-\infty, \infty)$

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

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

$$f(x, y, z) =$$

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

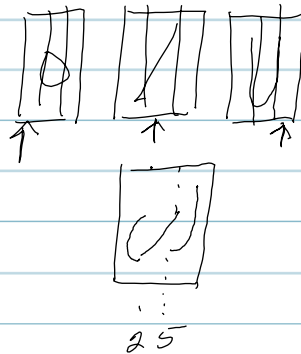
$$y = x^2 + 2$$

let $x = 0$
find y $y = 0^2 + 2$

$$f(x) = \begin{cases} x^2 & \text{if } x < 0 \\ |x| & \text{if } 0 < x < 2 \\ x+6 & \text{if } x \geq 2 \end{cases}$$

$$f(-2) = (-2)^2 = 4 \quad (-2, 4)$$

$$f(9) = 9+6 = 15 \quad (9, 15)$$

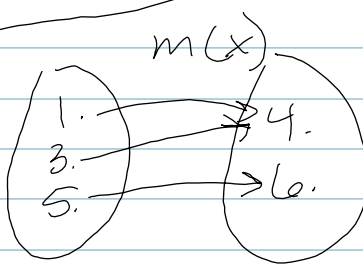
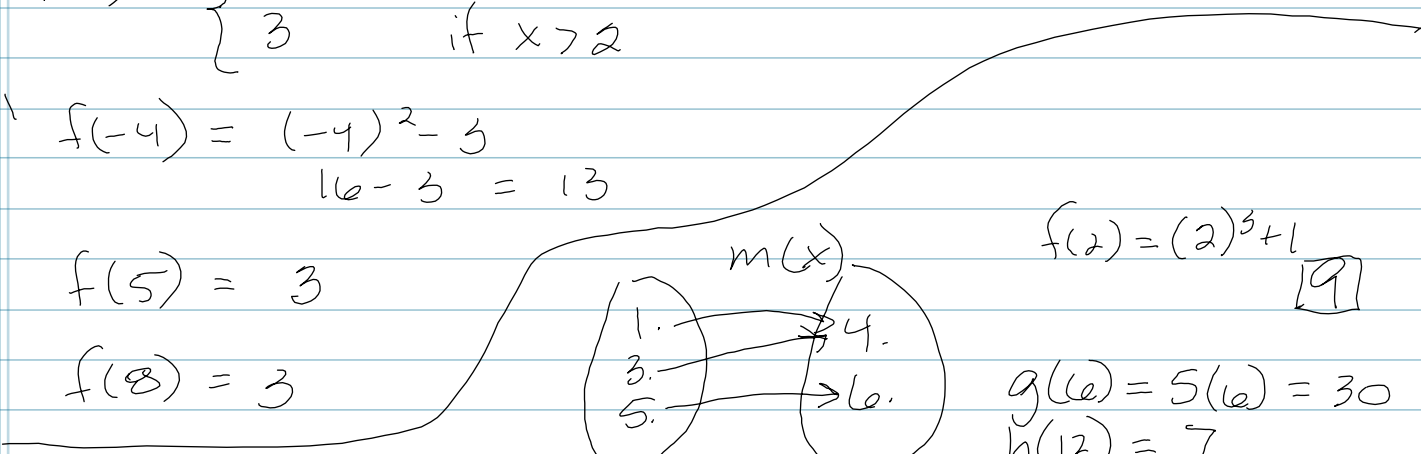


$$f(x) = \begin{cases} x^2 - 3 & \text{if } x \leq 2 \\ 3 & \text{if } x > 2 \end{cases}$$

$$\#1 \quad f(-4) = (-4)^2 - 3 \\ 16 - 3 = 13$$

$$f(5) = 3$$

$$f(8) = 3$$

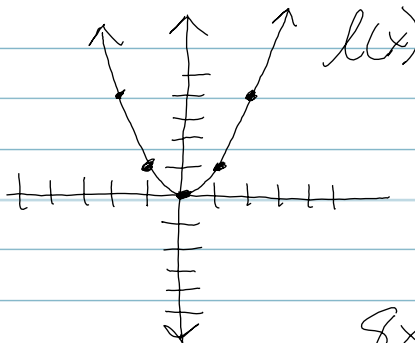


$$f(2) = (2)^3 + 1 = 9$$

$$g(6) = 5(6) = 30 \\ h(12) = 7 \\ h_1(2,000, \infty) = 7 \\ h(\infty) = 7$$

$$f(x) = x^3 + 1 \\ g(x) = 5x \\ h(x) = 7$$

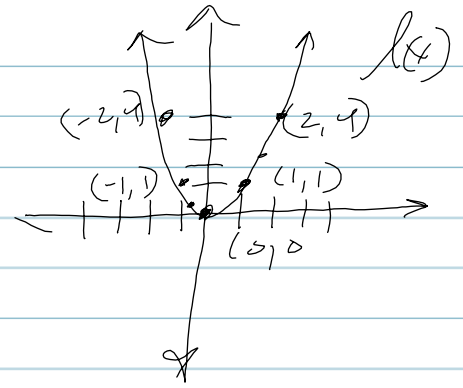
x	k(x)
1	5
2	7
3	9



$$f(2x-4) \\ (2x-4)^3 + 1 \\ = (x-2)(2x-4)(2x-4) + 1 \\ = (x-2)(4x^2 - 16x + 16) + 1 \\ = 4x^3 - 32x^2 + 32x - 16x^2 + 64x - 64 + 1 \\ = 4x^3 - 48x^2 + 96x - 63$$

$$\begin{aligned}k(1) &= 5 \\k(2) &= 7 \\k(3) &= 9 \\k(-1) &= \text{DNE}\end{aligned}$$

$$\begin{aligned}m(1) &= 4 \\m(5) &= 6 \\m(8) &= \text{DNE}\end{aligned}$$



$$\begin{aligned}f(1) &= 1 && (1, 1) \\f(2) &= 4 && (2, 4) \\f(1.5) &\approx 2 && (1.5, 2) \\f(-.5) &= \frac{1}{3} && (-.5, \frac{1}{3})\end{aligned}$$