

DR. TOM CUCHTA

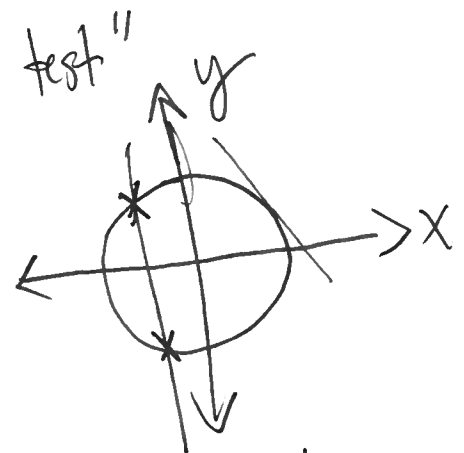
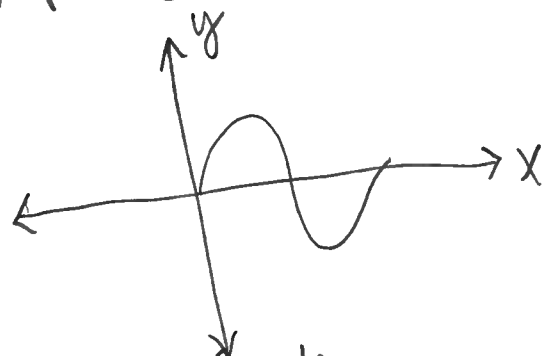
<http://tomcuchta.com>

MATH 2501

Functions

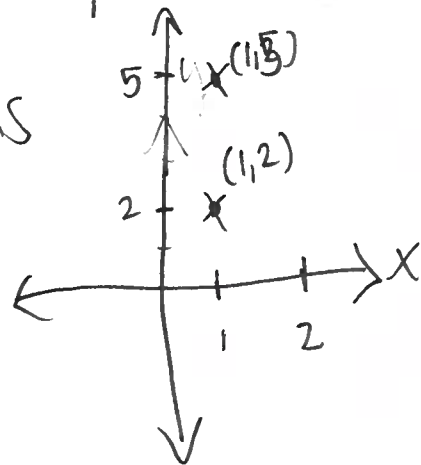
interpretations:

① graphical ~ "vertical line test"



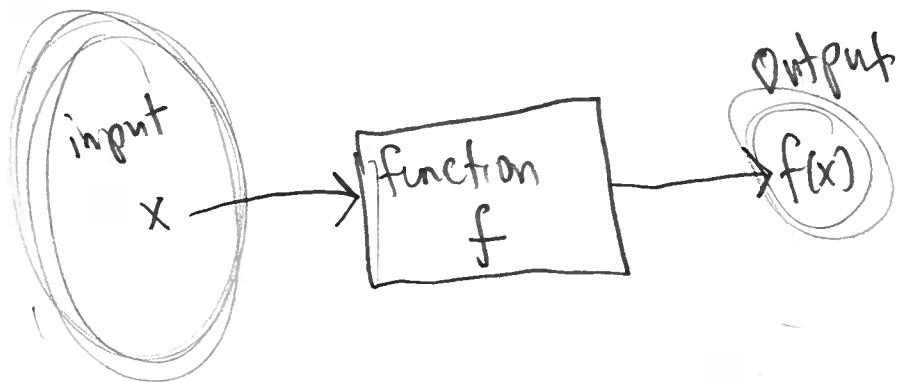
② list of ordered pairs $\sim \{(1,2), (1,5), (2,6)\}$. (2,6)
(w/ some props)
if (x_1, a) and (x_1, b) are in
list, then $a=b$

NOT a function
(fail v. line test)



②

③ input-output machine



④ A function is 4 things:

③

① name

② domain ~ set of inputs

③ codomain ~ where outputs can live

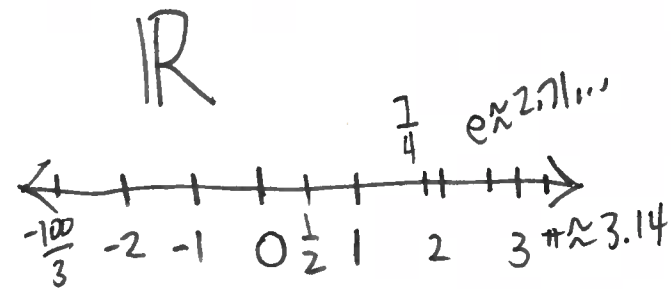
notation

"name: domain \rightarrow codomain"

name(x) = ~

(note: range ~ exactly outputs)

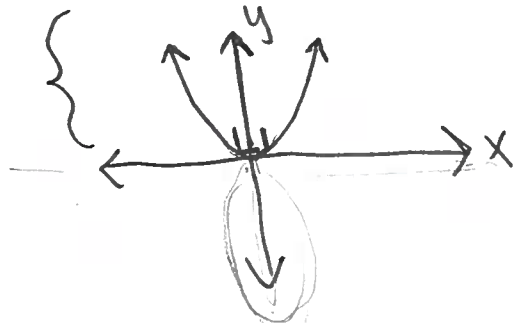
④ rule of assignment



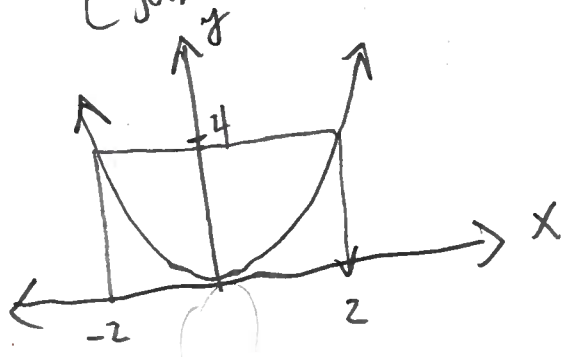
Examples

(A) $\begin{cases} f: \mathbb{R} \rightarrow \mathbb{R} \\ f(x) = x^2 \end{cases}$

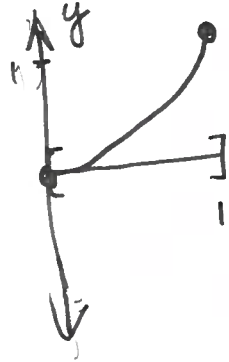
range $[0, \infty)$



(B) $\begin{cases} g: \mathbb{R} \rightarrow [0, \infty) \\ g(x) = x^2 \end{cases}$



(C) $\begin{cases} h: [0, 1] \rightarrow \mathbb{R} \\ h(x) = x^2 \end{cases}$



$$x^2 = 4$$



$$x = \pm\sqrt{4} = \pm 2$$

$$L^2 = 10$$

$$L = \pm\sqrt{10}$$

(4)

SSSS

Evaluating functions

$f(\text{number}) =$ output associated w/ the input "number"

1 5 5

$$f(x) = x^2 + 1$$

$$f(3) = 3^2 + 1 = 10$$

$$f(-2) = (-2)^2 + 1 = (-2)(-2) + 1 = 4 + 1 = 5$$

↑
 $-4 + 1 = -3$

$$f(a+7) = (a+7)^2 + 1$$

$$= (a+7)(a+7) + 1$$

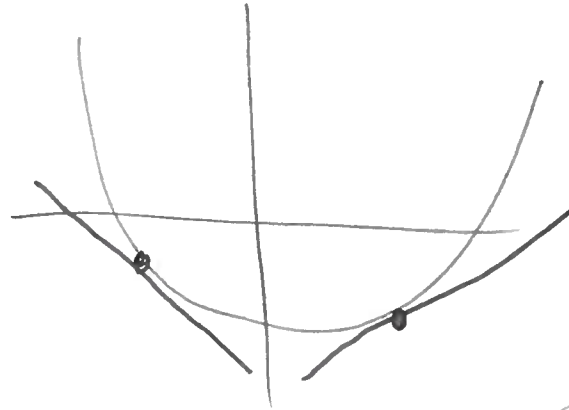
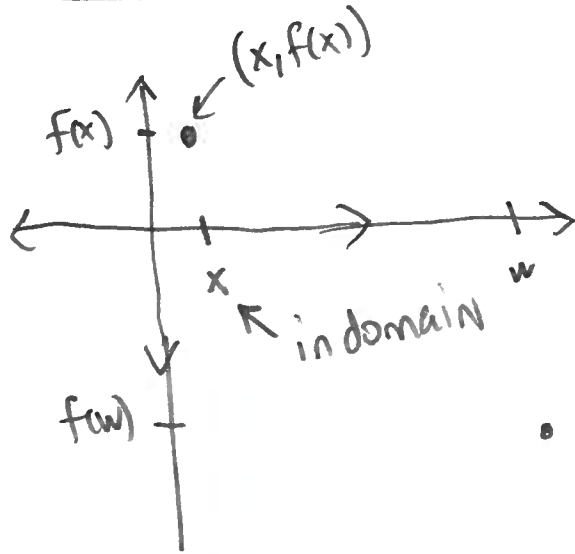
$$= (a+7)a + (a+7)7 + 1$$

$$= a^2 + 7a + 7a + 49 + 1$$
$$= a^2 + 14a + 50$$

7 7 7 7 7

7 2

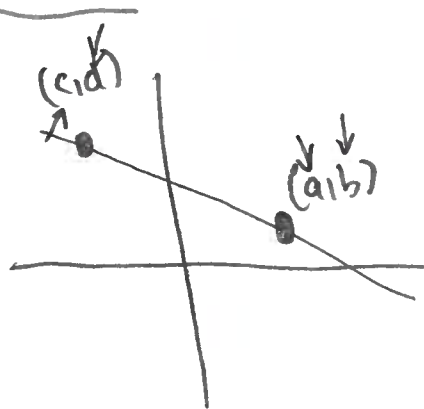
Graphing functions



• $(w, f(w))$

$$1 = \frac{-1}{-1}$$

Slope



$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{b-d}{a-c} \\ &= \frac{d-b}{c-a} = \left(\frac{d-b}{c-a}\right)(1) \\ &= \left(\frac{d-b}{c-a}\right)\left(\frac{-1}{-1}\right) \\ &= \frac{b-d}{a-c} \end{aligned}$$