

# Function

Wednesday, September 23, 2020

5:59 AM

✓  $y = x^2$

✓  $y = \log x$  ✓  $y = e^x$

✓  $y = (x-2)^2$

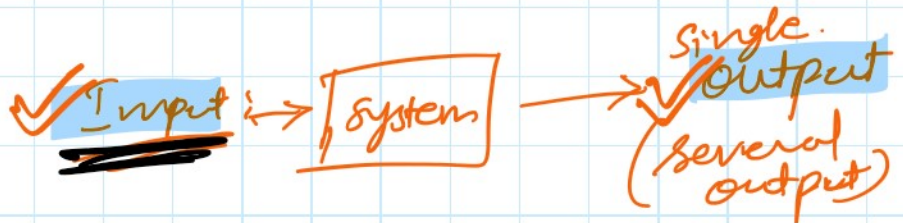
$\left\{ \begin{array}{l} x - \text{Independent variable} \\ y - \text{dependent variable.} \end{array} \right.$

#  $\left\{ \begin{array}{l} y = \pm \sqrt{x} \\ \underline{y^2 = x.} \end{array} \right\}$  or

How do we say that each expression represents a function.

## Definitions-

$\underline{2+5} \Rightarrow \left\{ \begin{array}{l} 7 \\ 8 \\ 9 \\ 10 \end{array} \right.$



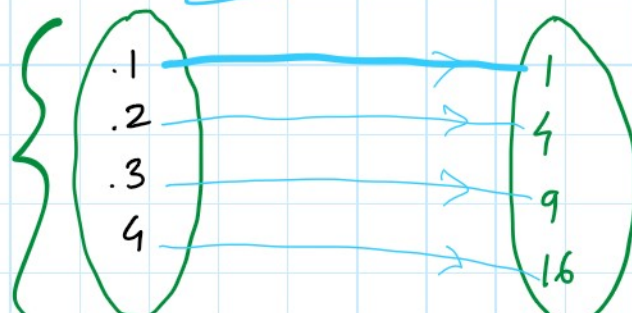
## Sets:

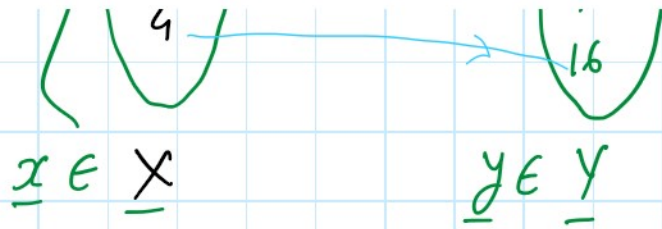
collection of similar object.

$C = \{ v, B, G, Y, O, R. \}$

#  $X = \{ 1, 2, 3, 4 \}$ ,  $Y = \{ 1, 4, 9, 16 \}$

mapping.





$y = x^2$  ← Relation

$x = 5$   
 $y = 25$  — single output.

✓ Functions: Are we getting single output for a particular input?

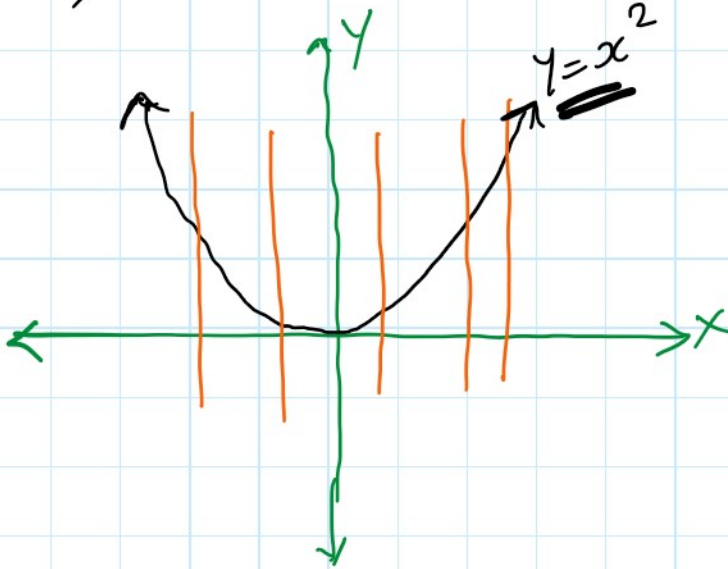
$y^2 = x$  — Not a function.

$x = 4$ ,  $y = \pm 2$   
 ↑                      |  
 input.                      output

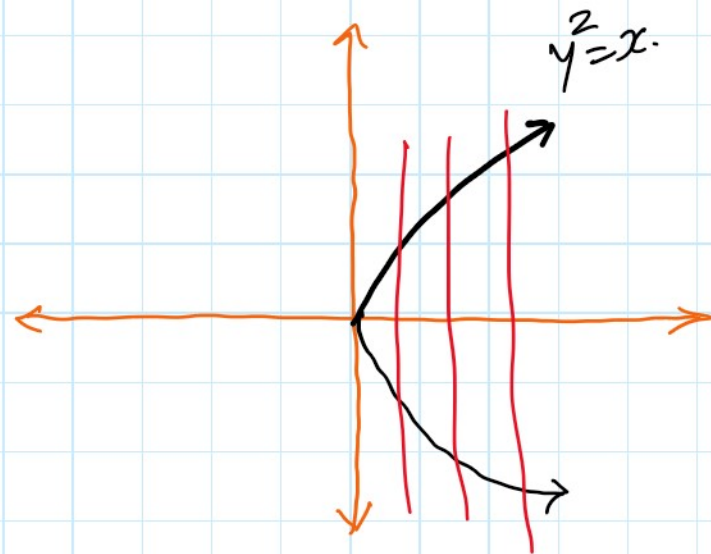
✓  $\begin{cases} (-2)^2 = 4 \\ (+2)^2 = 4 \end{cases}$

Graphical Representation:-

1)  $y = x^2$



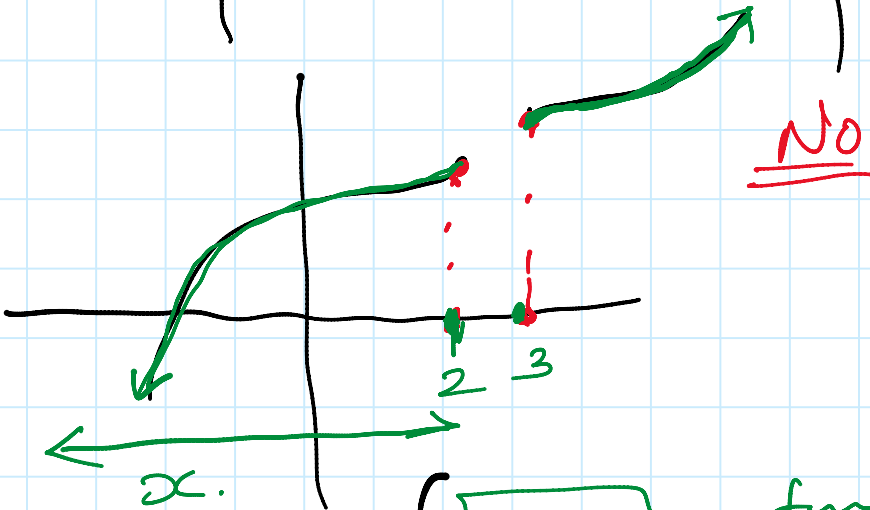
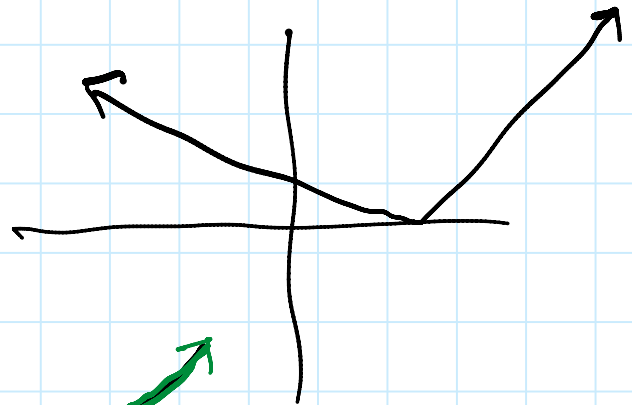
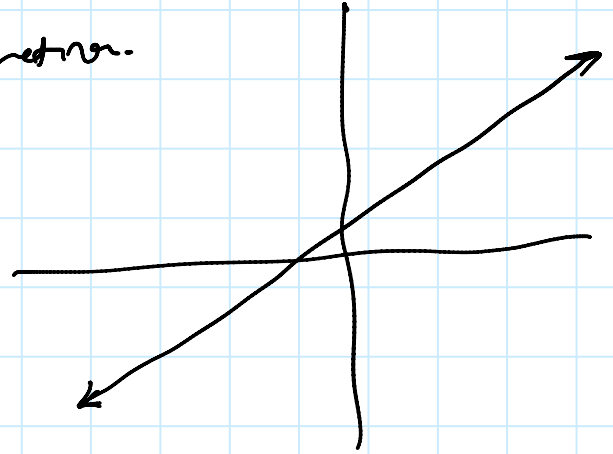
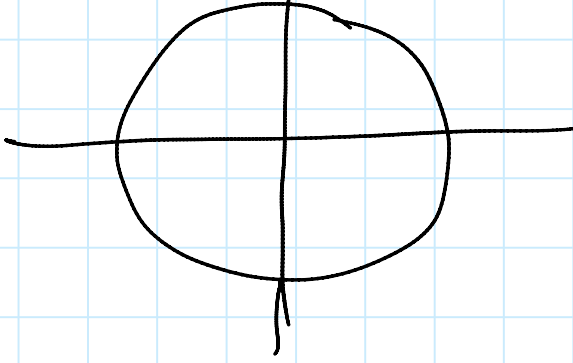
$y^2 = x$



Draw vertical line:- Test

Ex

Not a function.

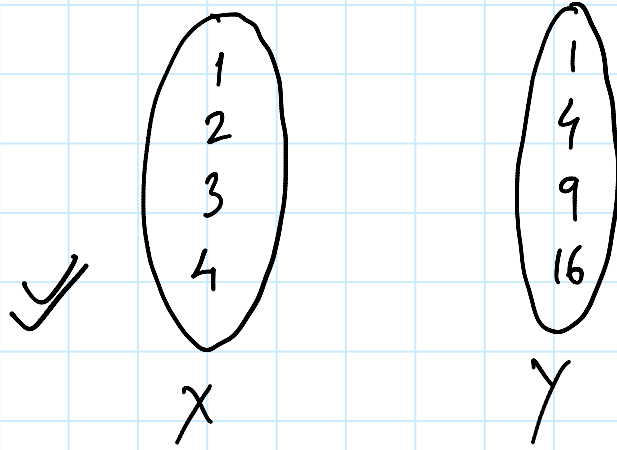


No

Domain.

$x \leq 2$  — function  
 $x \geq 3$  — function.

$x \in \mathbb{R}$  — Not a function.



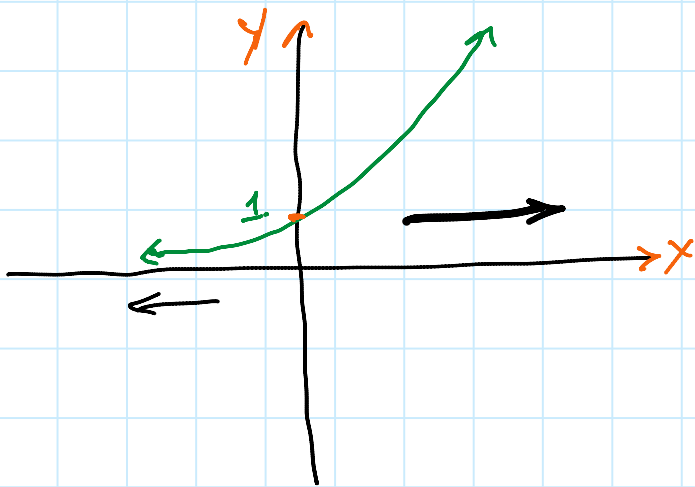
Domain & Range-

$D = \{1, 2, 3, 4\}$   
 $R = \{1, 4, 9, 16\}$

$y = x^2$   
 D:  $x \in \mathbb{R}$   
 R:  $y \in \mathbb{R}$

Ex  $y = e^x$   $x=0, y=e^0$   
 $y=1$

Exponential  $f^n$

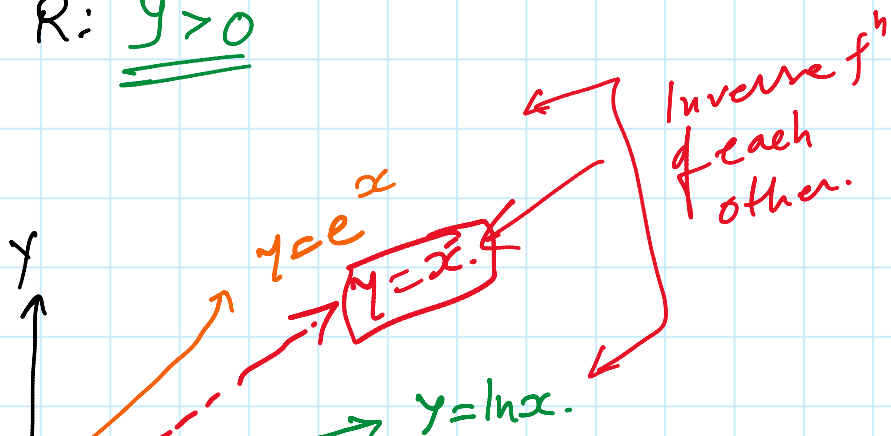


- 1) Can we say that this represents  $f^n$ :- YES.
- 2) D:  $x \in \mathbb{R}$ , R:  $y > 0$

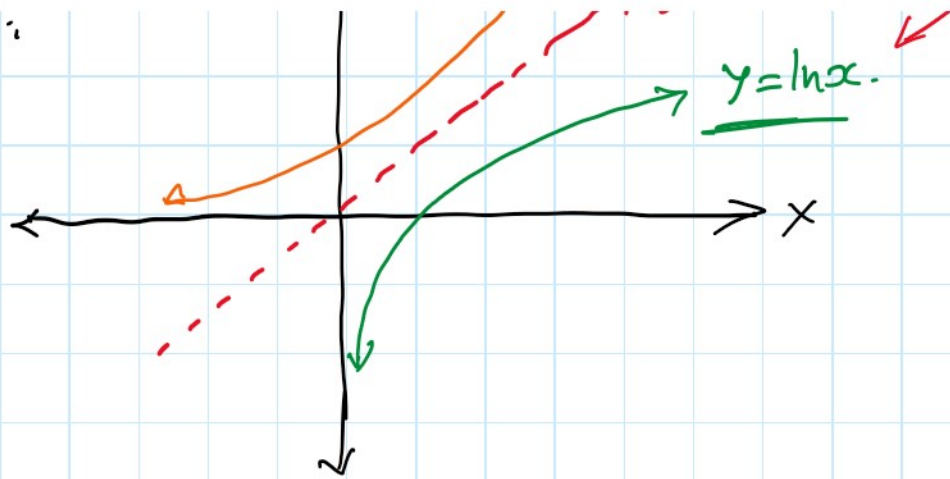
Ex

$y = \ln x$

Graph:



Graph:



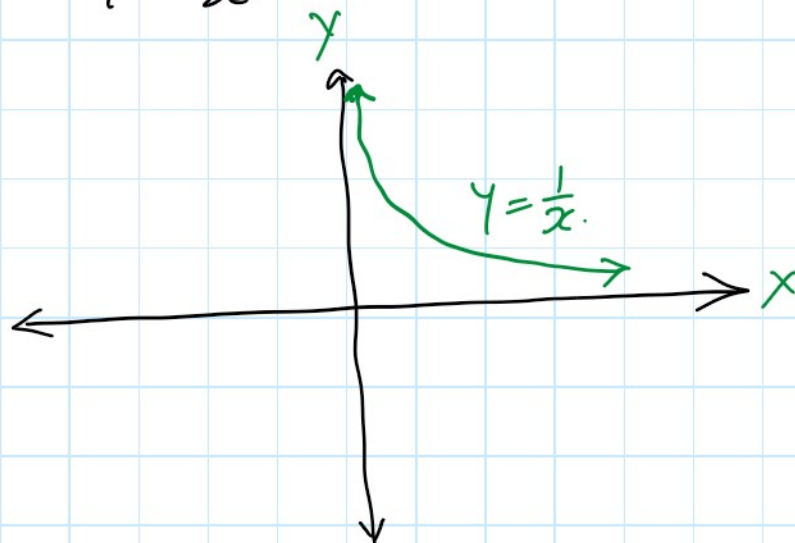
Domain:  $x > 0$

Range:  $y \in \mathbb{R}$

Ex: Rational function:-

$$y = \frac{1}{x}$$

Graph:



Domain:  $x > 0$

Range:  $y > 0$

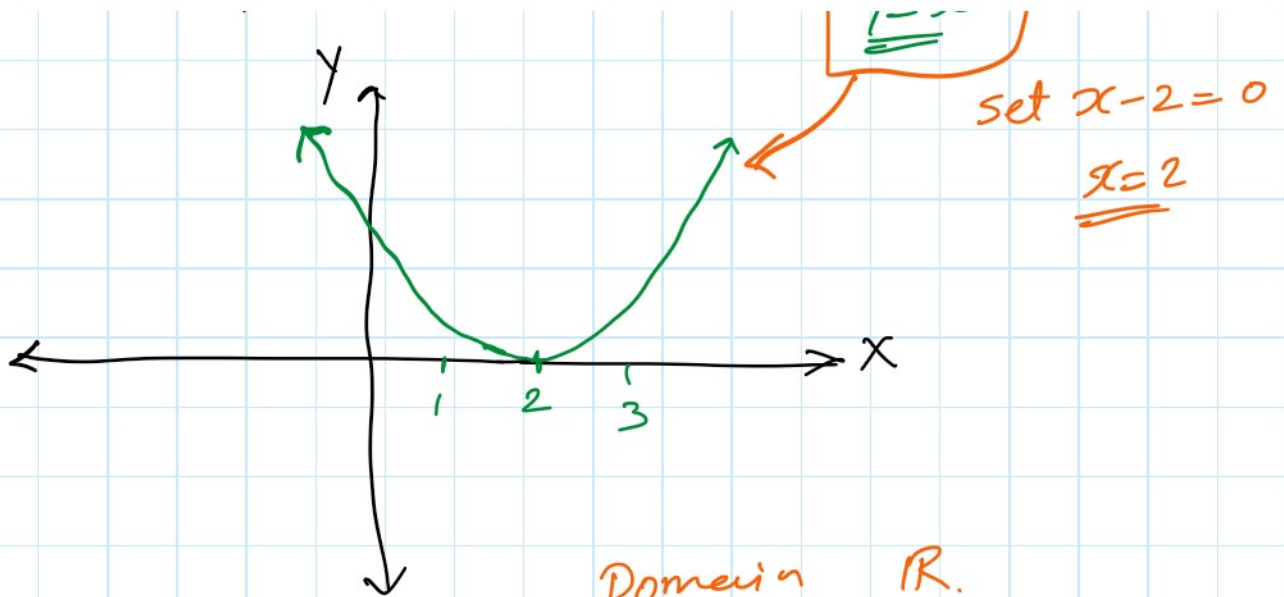
Ex:

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

$y \geq$

$$y = x^2$$

at  $x-2=0$



Domain  $\mathbb{R}$ .  
Range  $\mathbb{R}$ .

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

Transformation

Domain:  $x \in \mathbb{R}$ .

Range:  $y \geq 3$

Ex 7

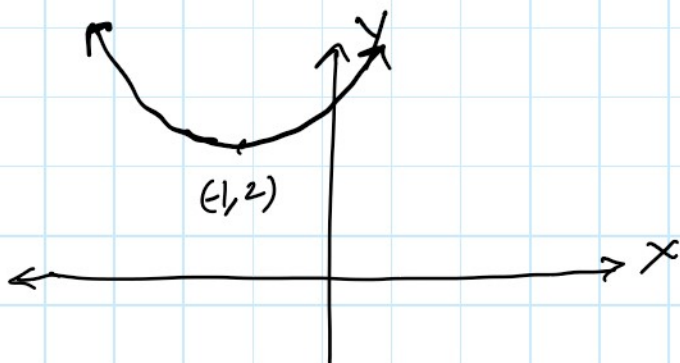
$y = x^2 + 2x + 3$

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

$y = x^2 + 2x + 1 + 2$

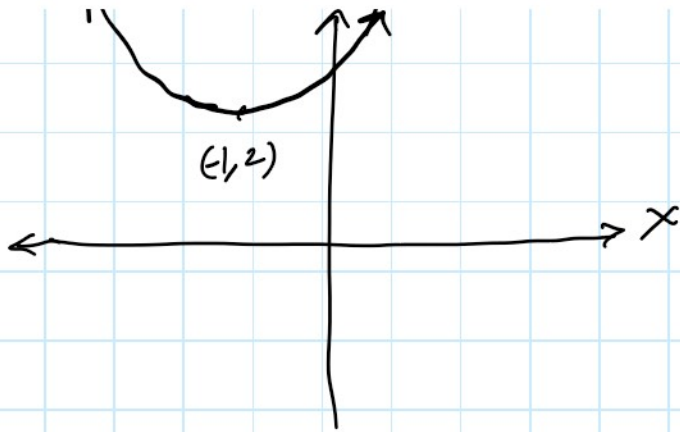
$y = (x+1)^2 + 2$

$\left(\frac{1}{2} \times 2\right)^2 = 1$



Domain:  $x \in \mathbb{R}$ .

Range:  $y \geq 2$



Domain:  $x \in \mathbb{R}$ .

Range:  $y \geq 2$

Ex:

$$y = x^2 - 9x + 8$$

$$\begin{cases} a=1 \\ b=-9 \end{cases}$$

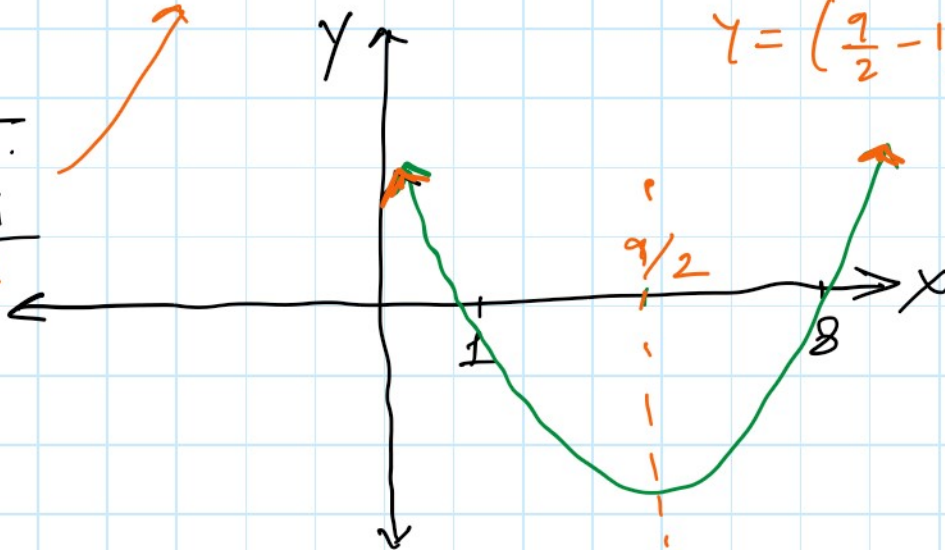
$$\checkmark y = (x-1)(x-8)$$

factorize:

$$y = \left(\frac{1}{2} - 1\right) \left(\frac{1}{2} - 8\right)$$

$$x = \frac{-b}{2a}$$

$$= \frac{9}{2}$$



$$= \frac{7}{2} \times \frac{-7}{2}$$

$$= \frac{-49}{4}$$

$$= \underline{\underline{-12.25}}$$

Domain:  $x \in \mathbb{R}$ .

Range:  $y \geq -12.25$

Ex:

$$\underline{\underline{y = 2x^2 + 4x + 9}}$$

HW