

Exp : Example

iff : \Leftrightarrow if and only if

\forall : for all

\exists : there exist

\in : belongs to

Def : definition

Th : Theorem

Q. : Question

A. : Answer

Ch1 : Function

$$f(x) = 2x - 1$$

$$y = 2x - 1$$

\parallel : Parallel

\perp : Perpendicular (normal)
(orthogonal)

D : Domain \hookrightarrow values of x

R : Range \hookrightarrow values of y

\mathbb{R} : Real numbers

$D(f)$: domain of f

$R(f)$: range of f

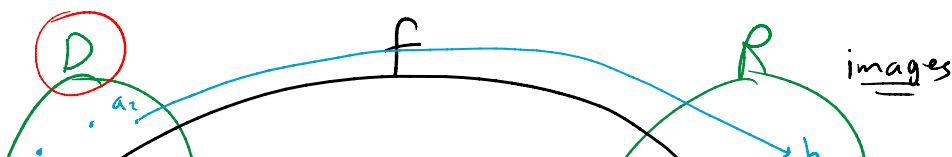
s.t : such that conv.

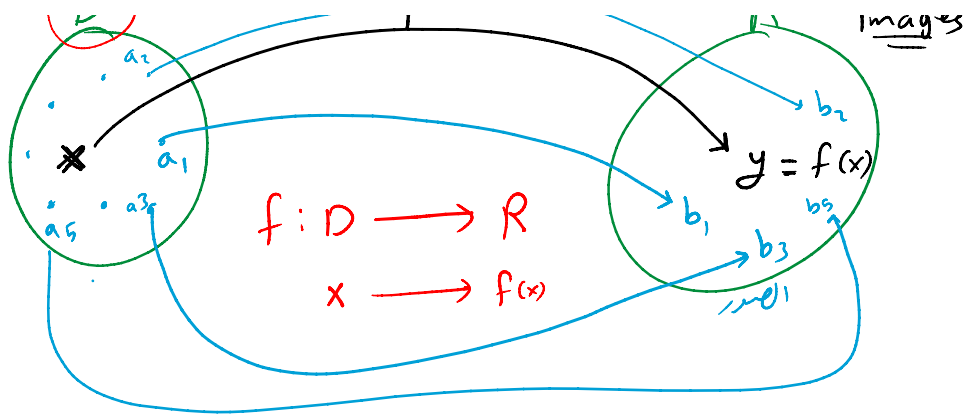
$$1 - \sqrt{c} = (\sqrt{c})^2$$

$$1 - \sqrt{c} = \sqrt{c}$$

$$y \leftarrow \sqrt{c}$$

$$x \leftarrow \sqrt{c}$$





function f is rule from D to R s.t
 f assigns to each point $x \in D$ a unique point
 $y = f(x) \in R$

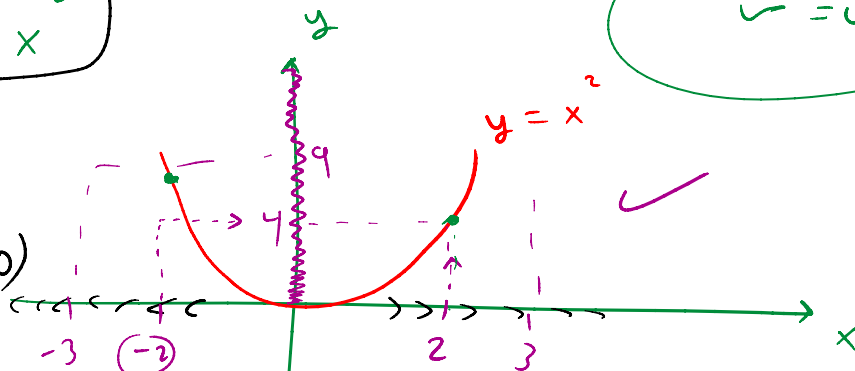
Exp $f(x) = x^2$

$x \rightarrow y$

$y = x^2$ is function

$D(f) = \mathbb{R} = (-\infty, \infty)$

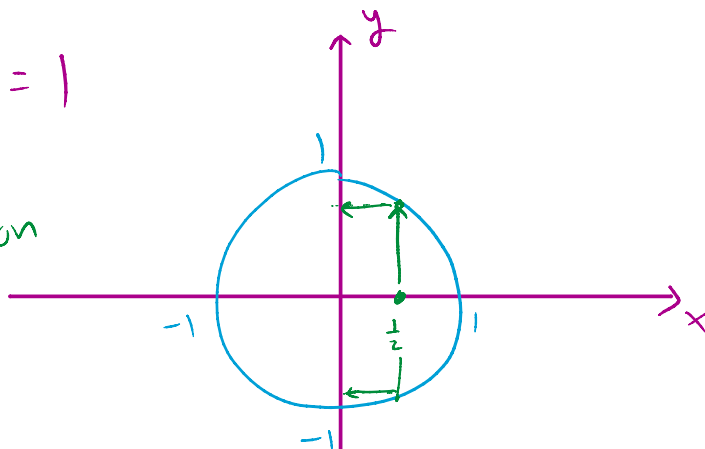
$R(f) = [0, \infty) = \mathbb{R}_0^+$

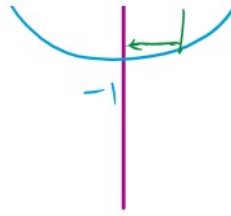


D : x قسم x المصحح تعويض في x اقتران
 \mathbb{R} : y قسم y الناتجة عن تعويض x

Exp

$x^2 + y^2 = 1$
 not
 function

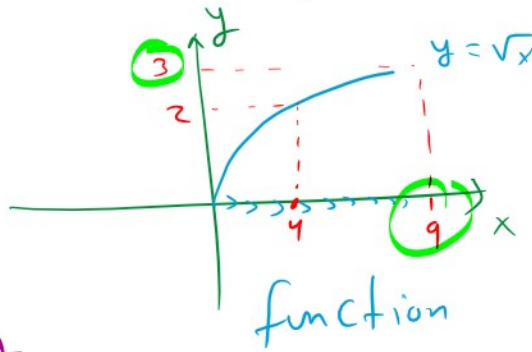




Exp $y = \sqrt{x}$

$D(f) = [0, \infty)$ values of x

$R(f) = [0, \infty)$ values of y



Exp Find $D(f)$ if $f(x) = \sqrt{9 - x^2}$

$9 - x^2 \geq 0$

$\Rightarrow \sqrt{9} \geq \sqrt{x^2}$

$3 \geq |x|$

$|x| \leq 3$

$x = -3$
 $x = -2$
 $x = -1$
 $x = 0, 1, 2, 3$

$-3 \leq x \leq 3$

$D = [-3, 3]$

~~$D = \{-3, 3\}$~~

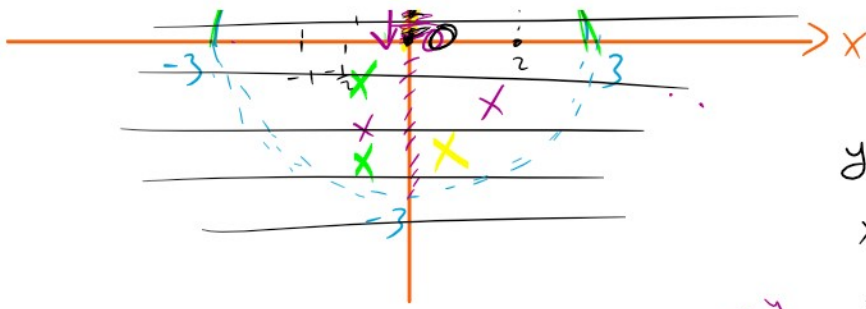
$R(f) = [0, 3]$



$y = \sqrt{9 - x^2}$

$y^2 = 9 - x^2$

$x^2 + y^2 = 9$



$$y = \sqrt{9 - x^2}$$

$$x \in [-3, 3]$$

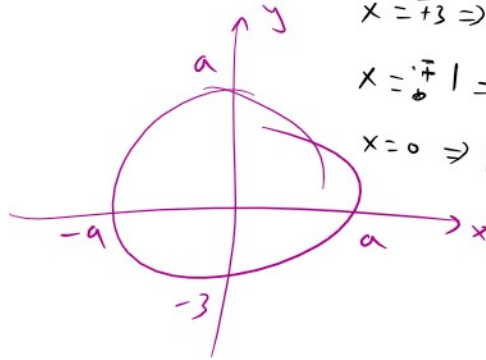
$$x = \pm 3 \Rightarrow y = \sqrt{9 - 9} = 0$$

$$x = \pm 1 \Rightarrow y = \sqrt{9 - 1} = \sqrt{8}$$

$$x = 0 \Rightarrow y = \sqrt{9} = 3$$

$$x^2 + y^2 = a^2$$

دائرة
مركزها
✓



$$|x| = 7 \Rightarrow x = \pm 7$$

$$|x| = a \Rightarrow x = \{-a, a\}$$

$$|x| \leq 2 \Rightarrow -2 \leq x \leq 2$$

$$\cancel{|4| \leq 2}, \cancel{|-5| \leq 2} \Rightarrow \boxed{[-2, 2]}$$

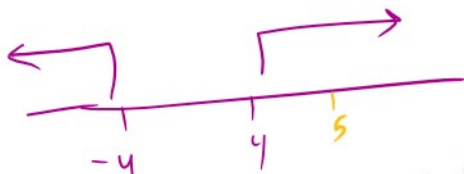
$$|x| \leq c \Rightarrow -c \leq x \leq c$$

$$|x| > 4 \Rightarrow (-4, 4) \times$$

$$|x| > 4 \times$$

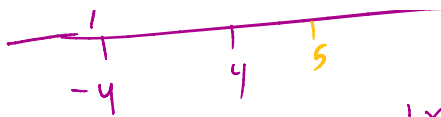
$$(4, \infty) \checkmark$$

$$(-\infty, -4) \checkmark$$



أو

$$x > 4 \text{ or } x < -4$$



$$|x| > 4 \Rightarrow x > 4 \text{ or } x < -4$$

$$|5| = 5 > 4$$

$$|-6| = 6 > 4 \checkmark$$