CH 2

11.3 Cont'd

Standard Form of an Ellipse

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

★ Know this

Centre = (h, k)

Ex: Consider $\frac{(x-2)^2}{36} + \frac{(y+3)^2}{25} = 1$

a) Centre?

$(2, -3)$

b) Find 4 points

Sub $x=2$:

$$\frac{(y+3)^2}{25} = 1$$

$$(y+3)^2 = 25$$

$$y+3 = \pm 5$$

$$y = -3 \pm 5$$

$(2, -8)$ and $(2, 2)$

Sub $y=-3$:

$$\frac{(x-2)^2}{36} = 1$$

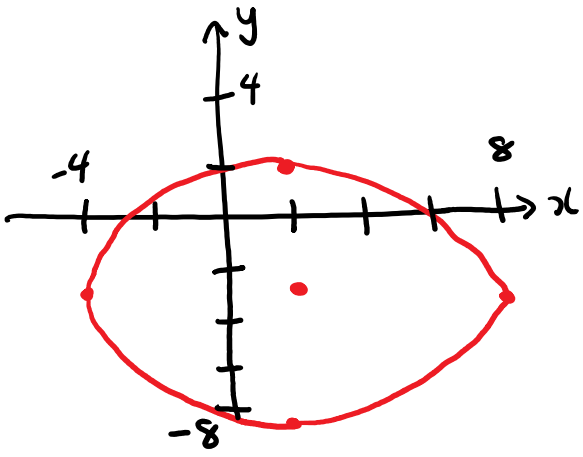
$$(x-2)^2 = 36$$

$$x-2 = \pm 6$$

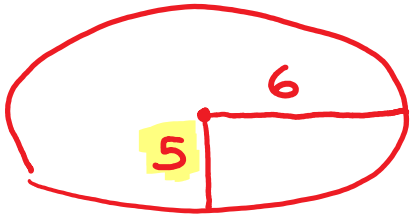
$$x = 2 \pm 6$$

$(-4, -3)$ and $(8, -3)$

c) Graph



Aside:



$$\frac{(x-2)^2}{36} + \frac{(y+3)^2}{25} = 1$$

Ex: Find the standard form

$$4x^2 + 3y^2 + 8x - 12y = -4$$

Complete the Square

$$4x^2+8x + 3y^2-12y = -4$$

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

Complete the Square

$\left(\frac{2}{2}\right)^2 = 1$ $\quad$ $\left(\frac{-4}{2}\right)^2 = 4$

$4(x^2+2x+1) + 3(y^2-4y+4) = -4 + 4(1) + 3(4)$

$4(x^2+2x+1) + 3(y^2-4y+4) = -4 + 4(1) + 3(4)$

$4(x+1)^2 + 3(y-2)^2 = 12$

$\div 12$

$$\frac{(x+1)^2}{3} + \frac{(y-2)^2}{4} = 1$$ ✓

$$\frac{(x+1)^2}{\sqrt{3}^2} + \frac{(y-2)^2}{2^2} = 1$$ ✓

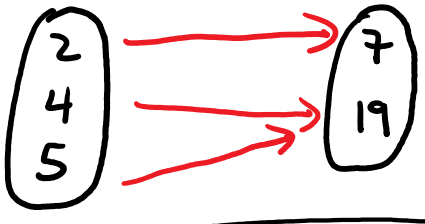
3.1 Functions

Relation: Mapping between 2 sets

Ex: Relation f is given by:

$f(2)=7$, $f(4)=19$, $f(5)=19$

As a mapping



As ordered pairs

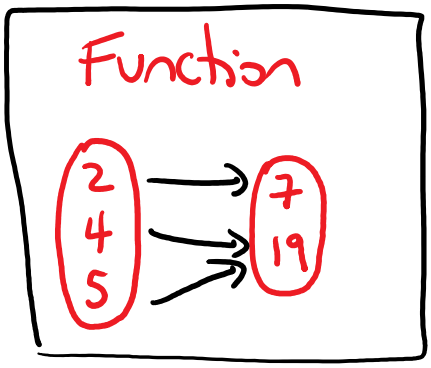
(2,7)
(4,19)
(5,19)

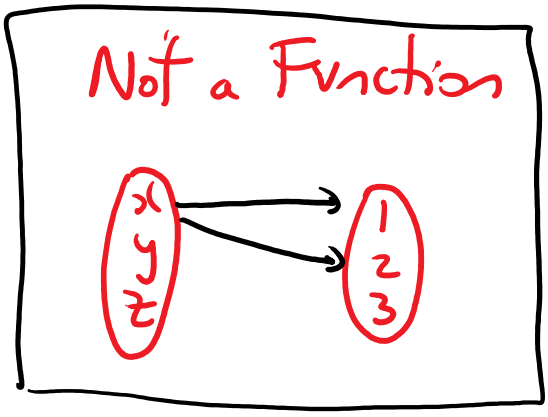
Domain: set of inputs (set of x-values)

Range: set of outputs (set of y-values)

A relation is a function if each element in the domain is sent to exactly 1 element in the range.

Ex:

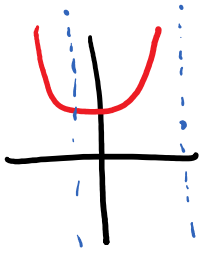




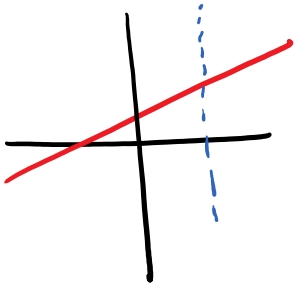
Intuitively: The output of a function is predictable.

Vertical Line Test

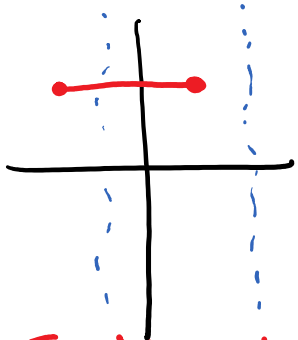
A graph represents a function (exactly when) if and only if every vertical line intersects the graph in at most 1 point.



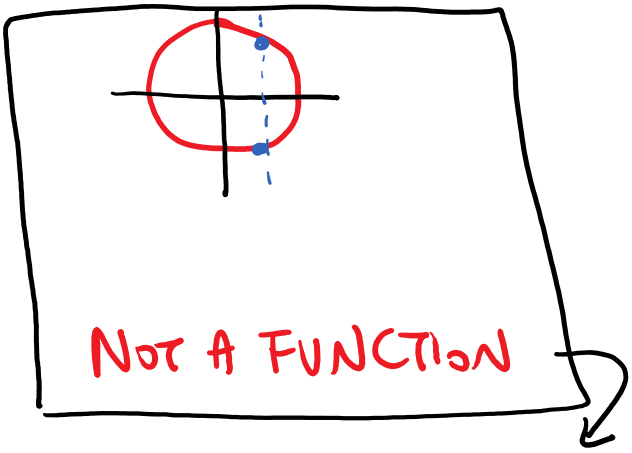
FUNCTION



FUNCTION



FUNCTION



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

$y^2=1-x^2$

$y=\pm\sqrt{1-x^2}$

Unpredictable Output