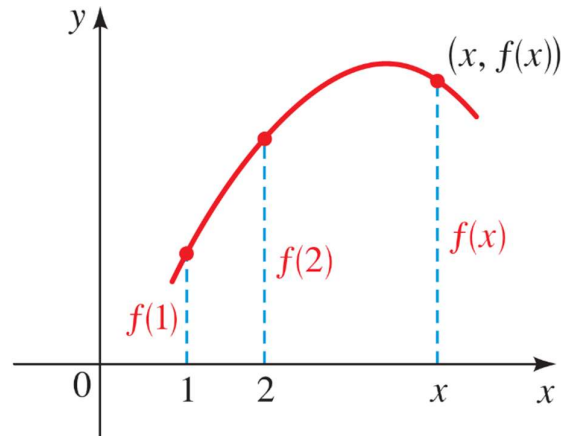


Section 2.2 – Graphs of Functions

- The **function** الدالة can be visualized through a graph by plotting all the point pairs $(f, f(x))$ in the xy -plane

نقدر نرسم الدالة كعلاقة بين x و $f(x)$ على المحاور x و y



Example 1

Sketch graphs of the following functions.

(a) $g(x) = 3x + 2$

(b) $h(x) = x^2$

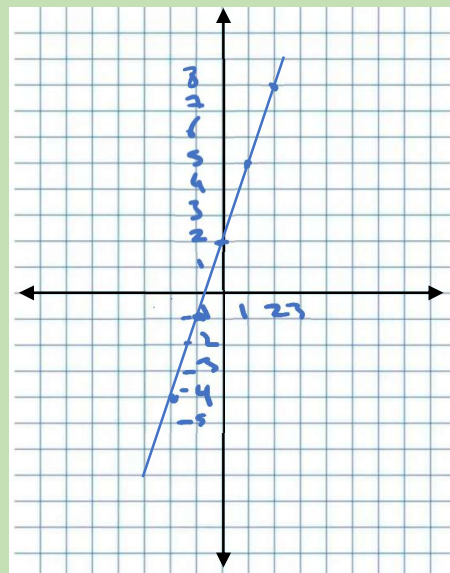
(c) $r(x) = x^3$

(d) $l(x) = \sqrt{x}$

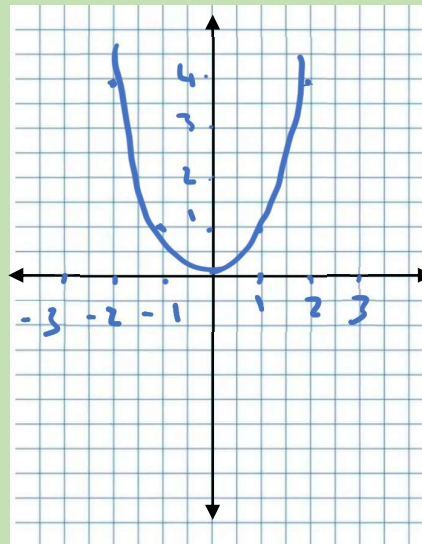
Solution

(a)

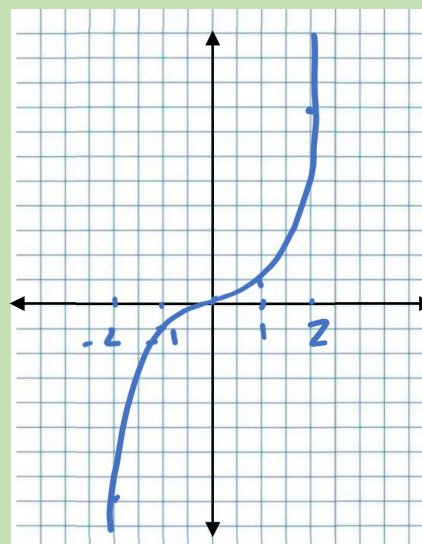
x	$g(x)$
-2	$3(-2) + 2 = -4$
-1	$3(-1) + 2 = -1$
0	$3(0) + 2 = 2$
1	$3 \cdot 1 + 2 = 5$
2	$3 \cdot 2 + 2 = 8$



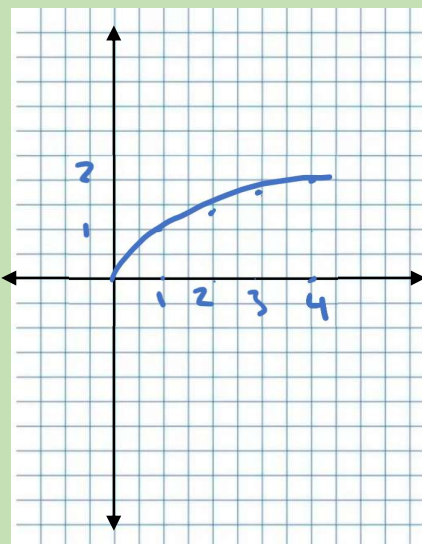
x	$h(x)$
-2	$(-2)^2 = 4$
-1	$(-1)^2 = 1$
0	0
1	1
2	4



x	$r(x)$
-2	-8
-1	-1
0	0
1	1
2	8

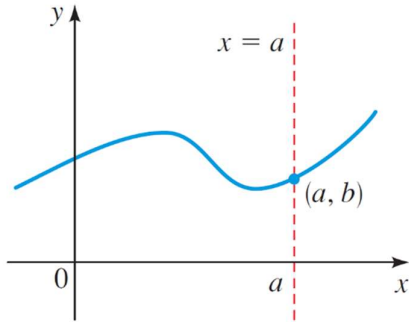


x	$l(x)$
0	$\sqrt{0} = 0$
1	1
2	1.414...
3	1.732...
4	2



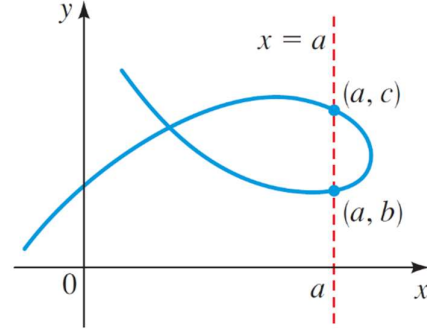
- Not every graph in the xy -plane represents a function. To verify whether a graph does, we try to plot a vertical line that intersects the curve more than once

للتعرف على الدالة من الرسم تتأكد من عدم إمكانية رسم خط عمودي يمر بالمنحنى أكثر من مرة واحدة فقط



Graph of a function

دالة لأن أي خط عمودي نقوم برسمه سيمر بالمنحنى الدالة مرة واحدة فقط.

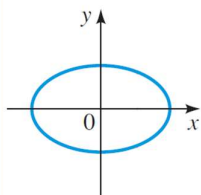


Not a graph of a function

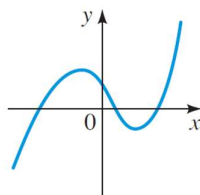
ليست دالة لأن يمكن رسم خطوط عمودية تقطع منحنى بالدالة أكثر من مرة.

Example 2

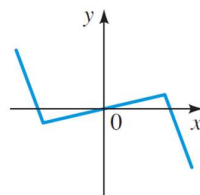
Using the Vertical Line Test, determine which of the graphs represent a function and which ones don't



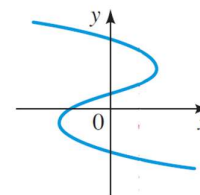
(a)



(b)



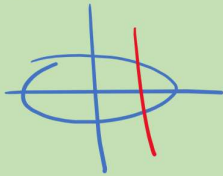
(c)



(d)

Solution

(a)

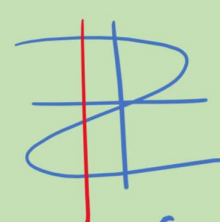


Not a function

(b) Function

(c) Function

(d)



Not a function

- Not every equation represents a function. A function must have one and only one value of y for any value of x

لا تكون المعادلة دالة إلا إذا كانت أي قيمة ل x تعطي قيمة واحدة فقط ل y طبقا لتعريف المعادلة

Example 3

Does the equation define y as a function of x ?

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

(b) $x^2 + y^2 = 4$

Solution

$$(a) \quad y - x^2 = 2$$

$$y = x^2 + 2$$

Function: any value of x gives only one value of y

$$(b) \quad x^2 + y^2 = 4$$

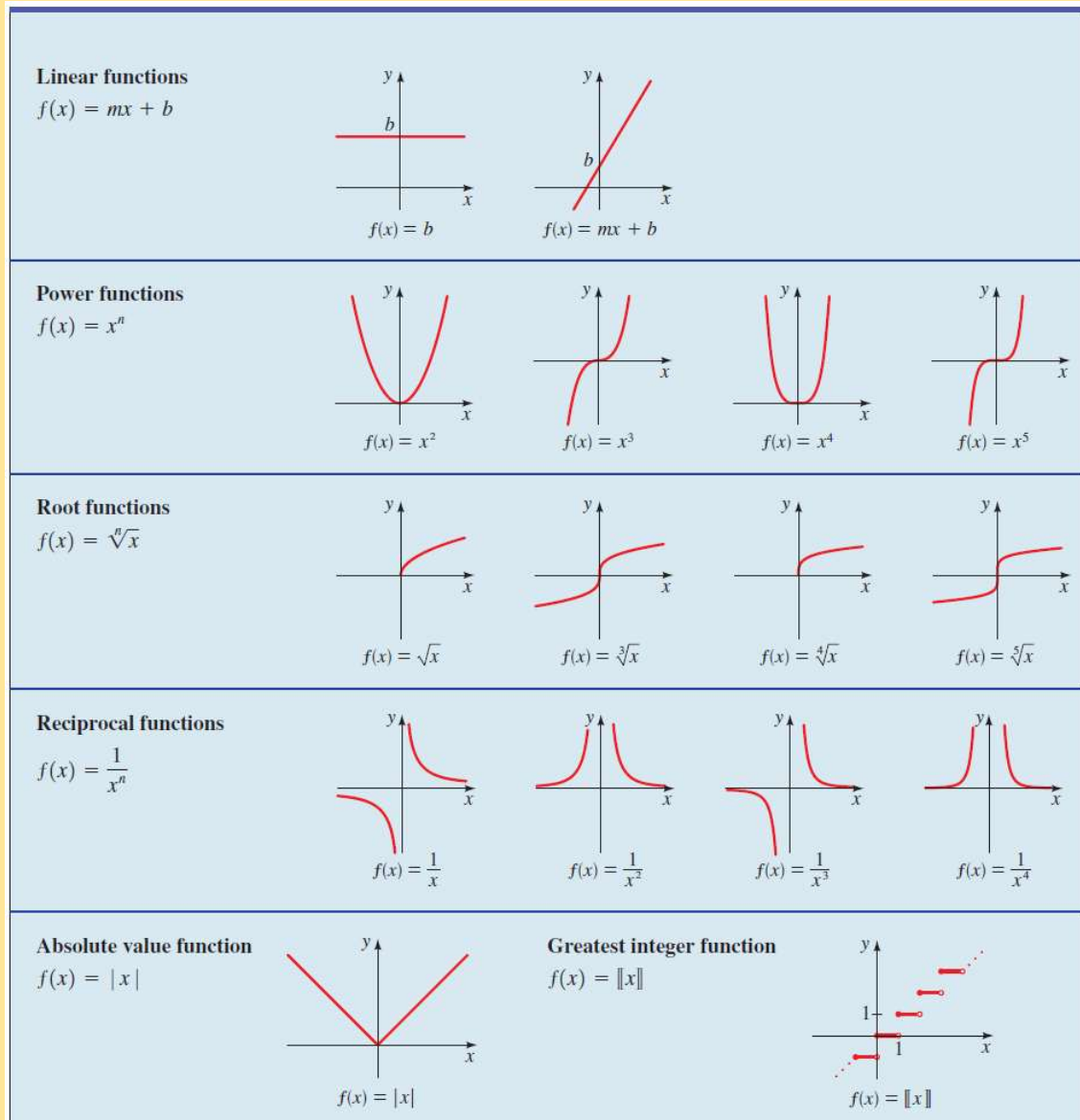
$$y^2 = 4 - x^2$$

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

Not a function: any value of x gives 2 (positive and negative) values of y

لاحظ

بعض المعادلات المهمة و طريقة رسمها

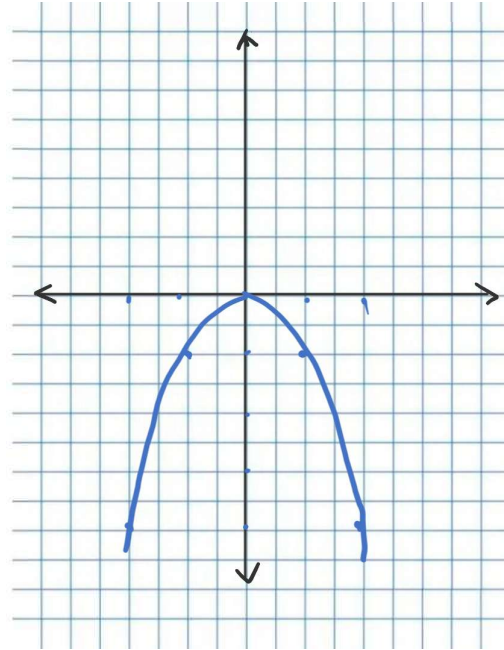


Problems

- Sketch a graph of the function by first making a table of values:

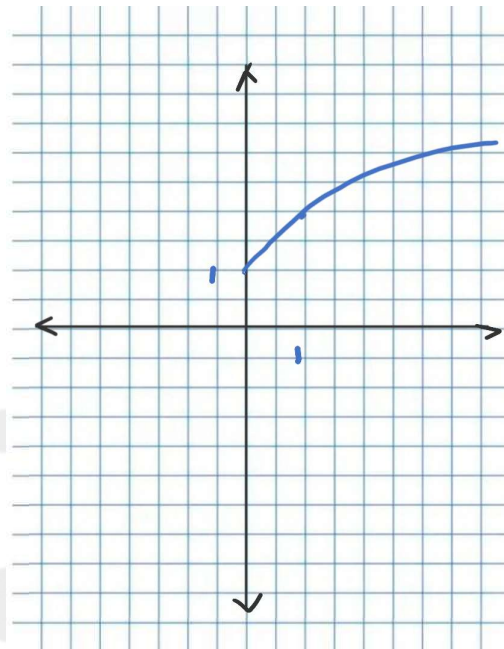
$$f(x) = -x^2$$

x	$f(x)$
-2	$-(-2)^2 = -4$
-1	$-(-1)^2 = -1$
0	0
1	$-(1)^2 = -1$
2	$-(2)^2 = -4$

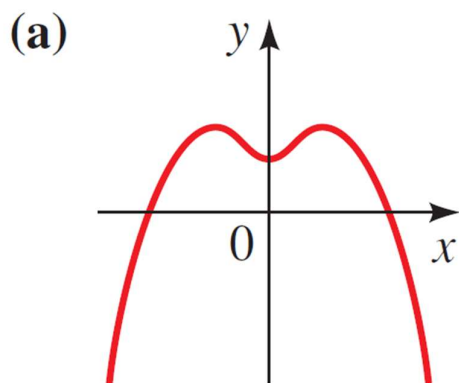


$$f(x) = 1 + \sqrt{x}$$

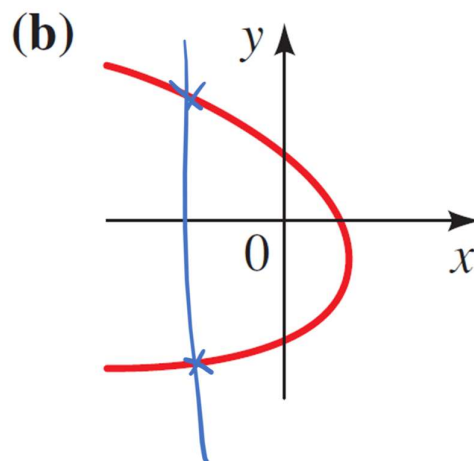
x	$f(x)$
0	$1 + \sqrt{0} = 1$
1	$1 + \sqrt{1} = 2$
2	$1 + \sqrt{2} = 2.4$
3	$1 + \sqrt{3} = 2.7$



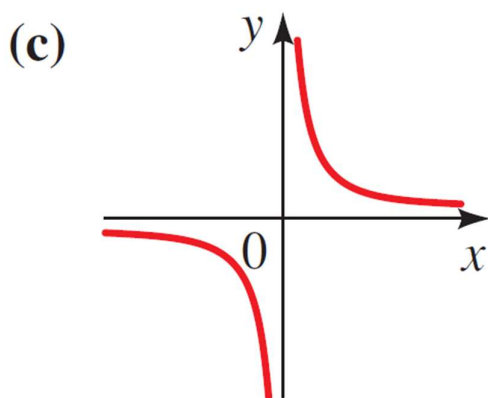
- Use the Vertical Line Test to determine whether the curve is a graph of a function of x .



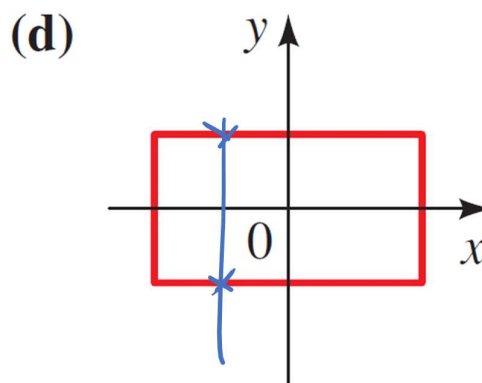
Function



Not a function



Function



Not a function

- Determine whether the equation defines y as a function of x .

$$3x - 5y = 7$$

$$3x - 7 = 5y$$

$$y = \frac{3x - 7}{5}$$

Function

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

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

$$y^2 = \frac{2x - 3}{4}$$

$$y = \pm \sqrt{\frac{2x - 3}{4}}$$

Not a function