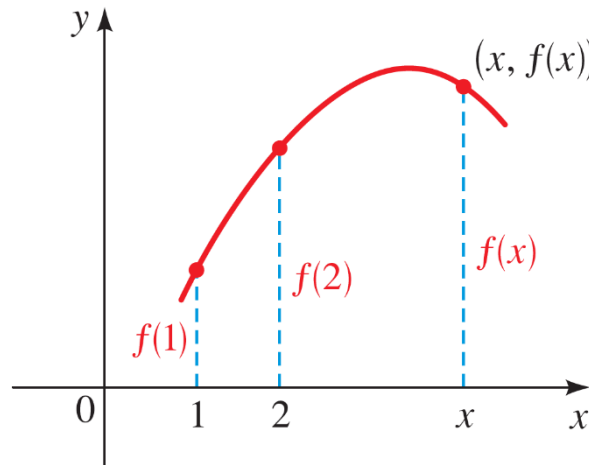


Section 2.2 – Graphs of Functions

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

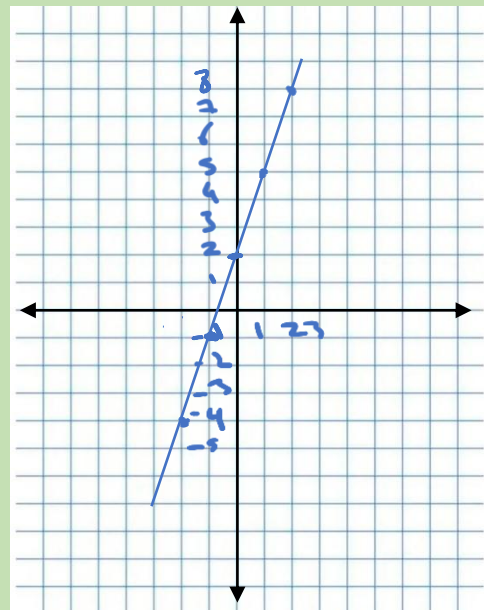
(c) $r(x) = x^3$

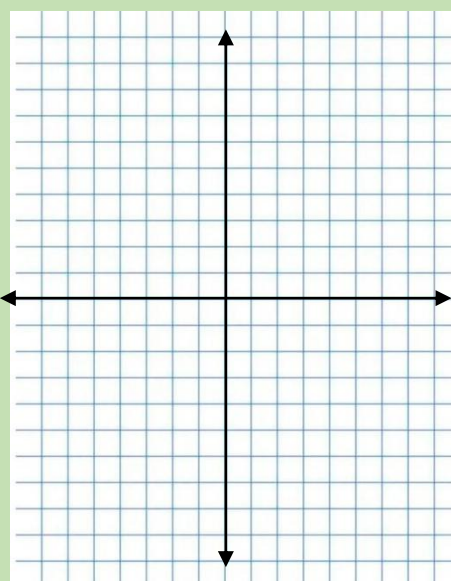
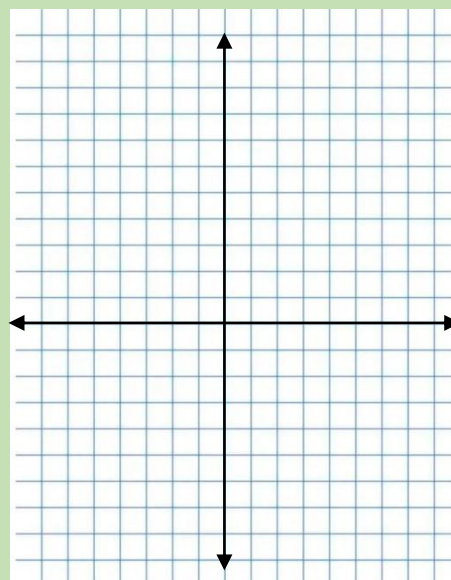
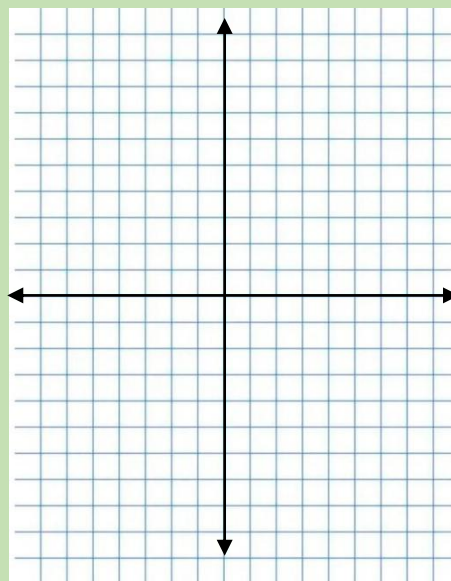
(d) $l(x) = \sqrt{x}$

Solution

(a)

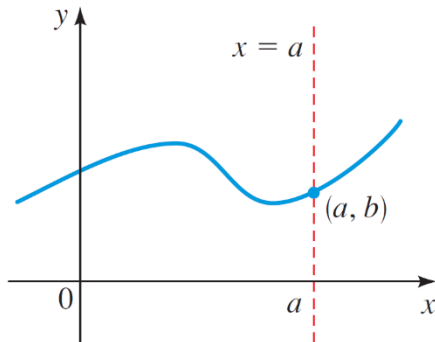
x	$g(x)$
-2	$3(-2) + 2 = -4$
-1	$3(-1) + 2 = -1$
0	$3(0) + 2 = 2$
1	$3 \cdot 1 + 2 = 5$
2	$3 \cdot 2 + 2 = 8$





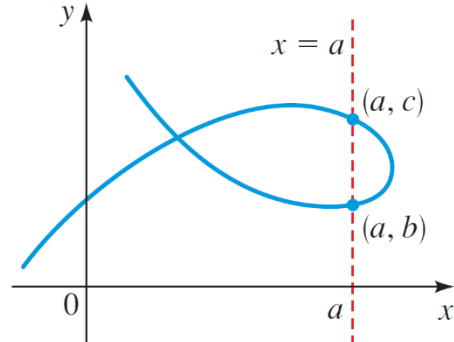
- Not every graph in the xy -plane represents a function. To verify whether a graph does, we try to plot a vertical line that intersects the curve more than once

للتعرف على الدالة من الرسم نتأكد 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.

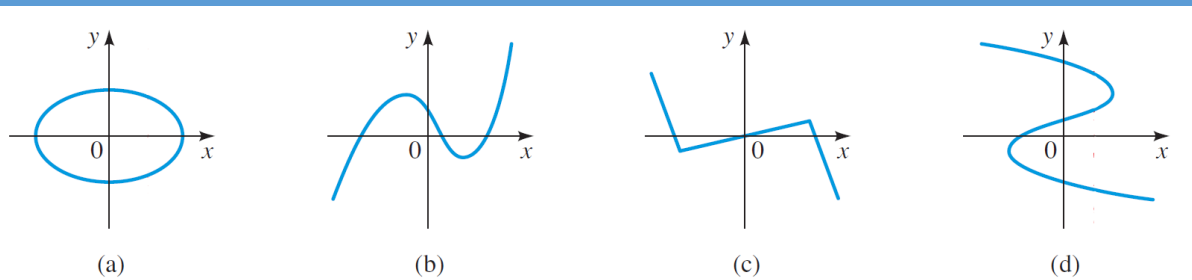


Not a graph of a function

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



Solution

(a)

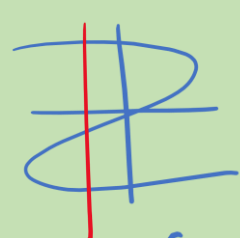


Not a function

(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

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

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

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

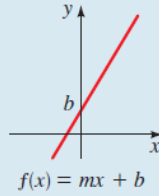
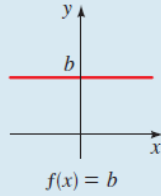
Not a function: any value of x gives 2 (positive and negative) values of y

لاحظ

بعض المعادلات المهمة و طريقة رسمها

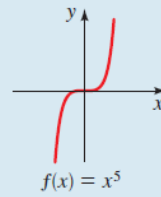
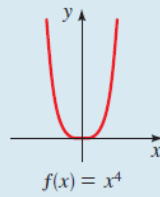
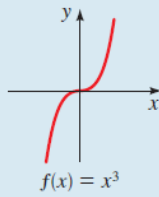
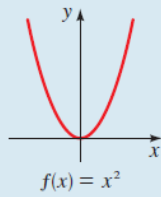
Linear functions

$$f(x) = mx + b$$



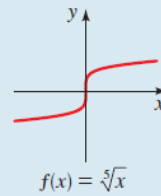
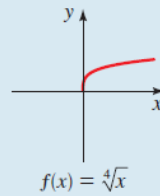
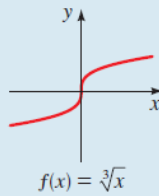
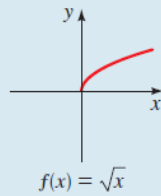
Power functions

$$f(x) = x^n$$



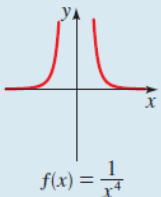
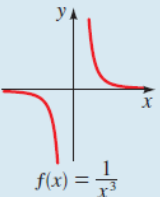
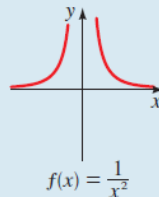
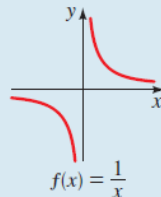
Root functions

$$f(x) = \sqrt[n]{x}$$



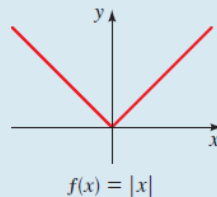
Reciprocal functions

$$f(x) = \frac{1}{x^n}$$



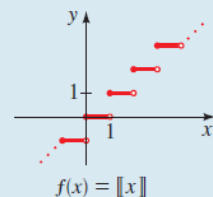
Absolute value function

$$f(x) = |x|$$



Greatest integer function

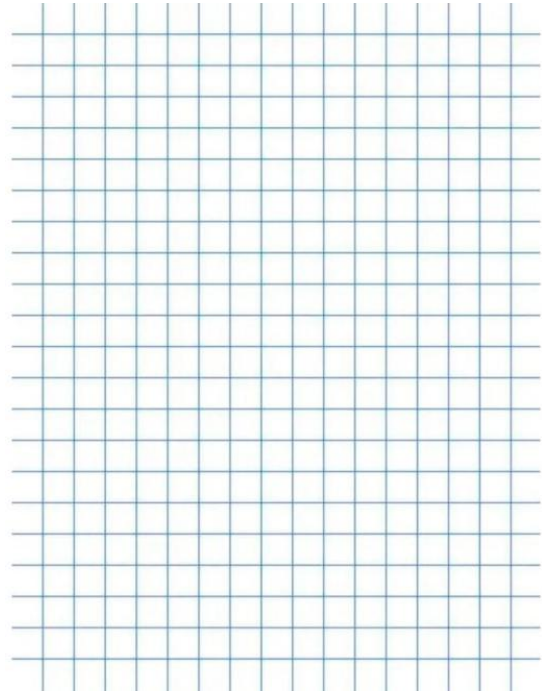
$$f(x) = \llbracket x \rrbracket$$



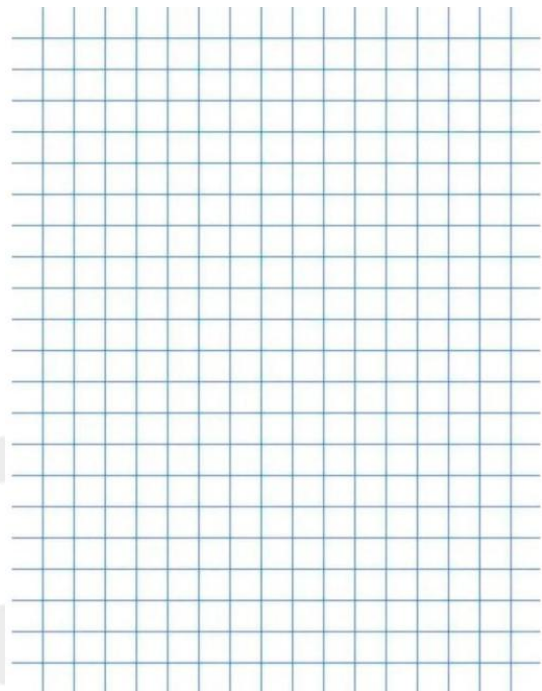
Problems

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

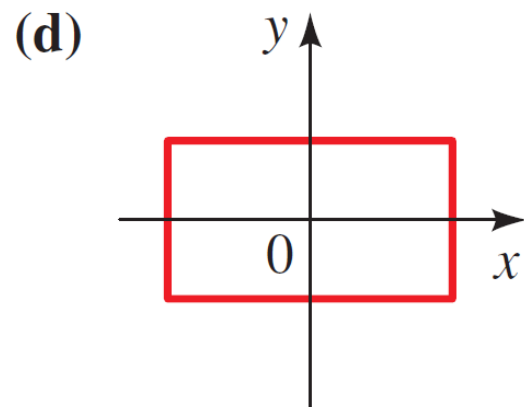
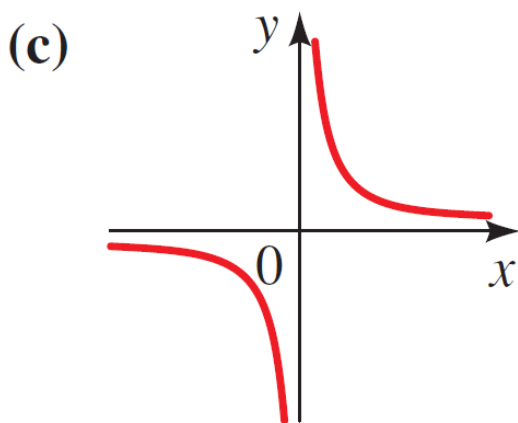
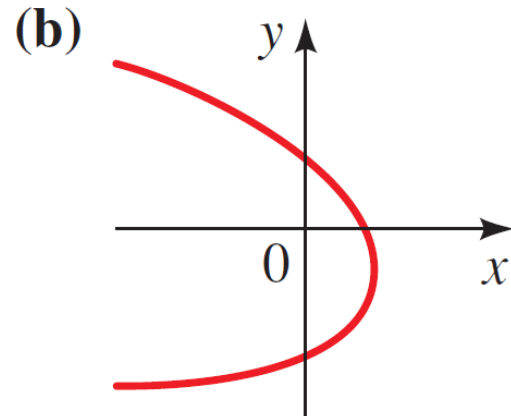
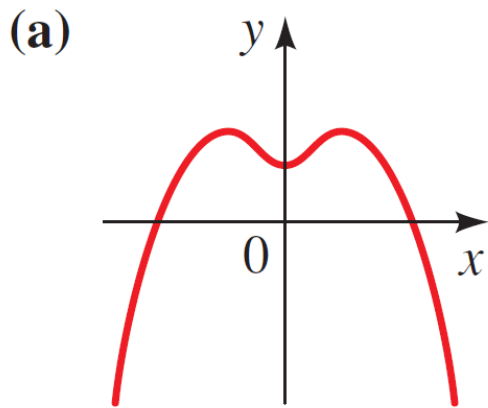
$$f(x) = -x^2$$



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



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



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

$$3x - 5y = 7$$

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