§ 2.2: Graphs of Functions

Graphing Functions

The Graph of a Function

If f is a function with domain A, then the **graph** of f is the set of ordered pairs

$$\{(x, f(x)) : x \in A\}$$

In other words, the graph of f is the set of all points (x,y) such that $y = f(x)$; that is, the graph of f is the graph of the equation $y = f(x)$.

Example 1	Graphing Functions

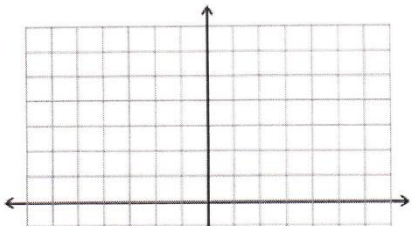
Sketch the graph of the following functions.

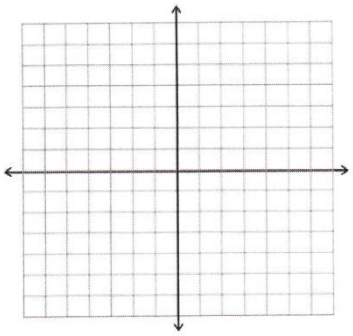
(a) $f(x) = x^2$

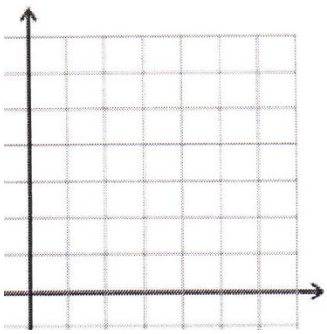
(b) $g(x) = x^3$

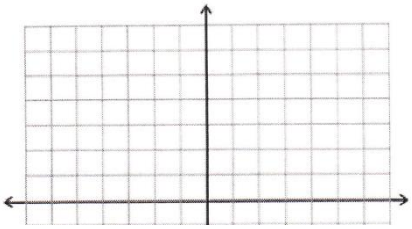
(c) $h(x) = \sqrt{x}$

(d) $i(x) = |x|$



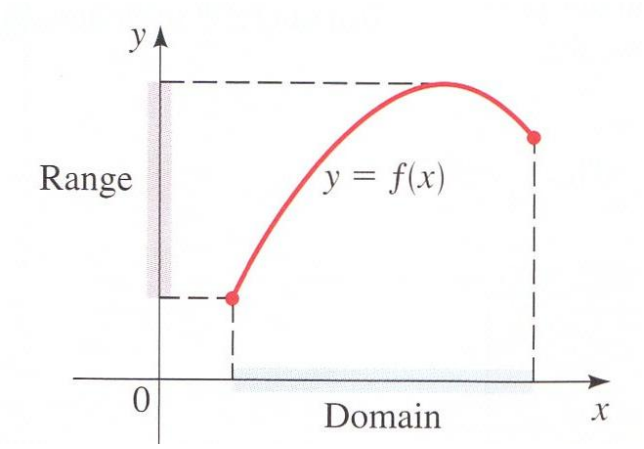






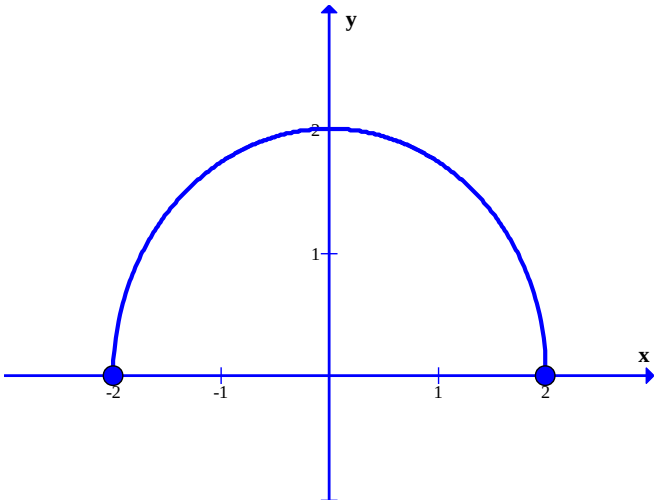
Getting Information from the Graph of a Function

The graph of a function helps us picture the domain and range of the function on the x-axis and y-axis as shown below.



Example 2	Finding the Domain and Range from a Graph

Below is the graph of the function $f(x) = \sqrt{4 - x^2}$. Find the domain and range of f.

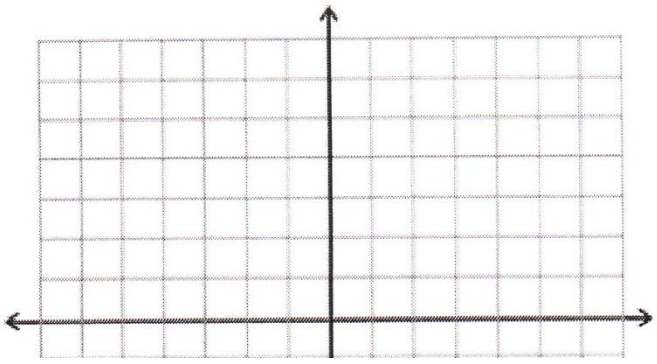


Graphing Piecewise Defined Functions

Example 3	Graph of a Piecewise Defined Function

Sketch the graph of the function

$$f(x) = \begin{cases} x^2 & x \leq 1 \\ 2x + 1 & x > 1 \end{cases}$$

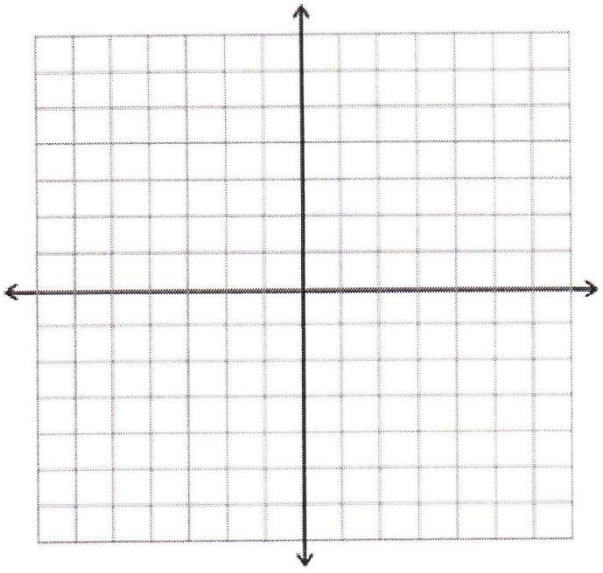


The **greatest integer function** is defined by

$$\lfloor x \rfloor = \text{greatest integer which is less than } x$$

Example 4	Graph of the Greatest Integer Function

Sketch the graph of $f(x) = \lfloor x \rfloor$.



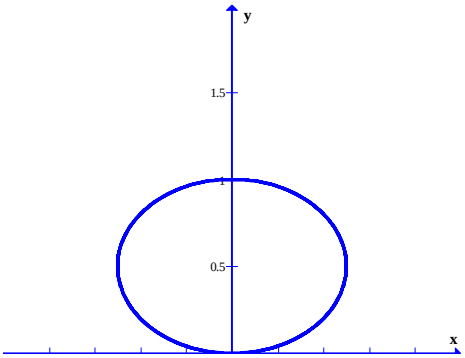
The Vertical Line Test

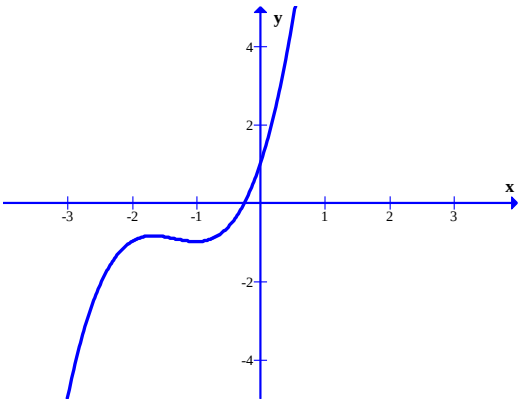
The Vertical Line Test

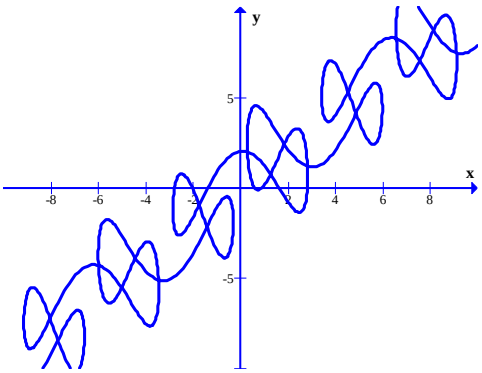
A curve in the coordinate plane is the graph of a function if and only if no vertical line intersects the curve more than once.

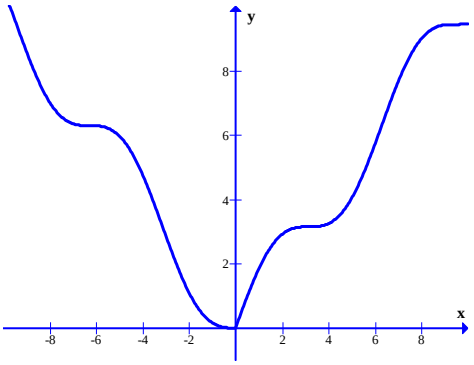
Example 5	Using the Vertical Line Test

Using the vertical line test, determine which of the following curves are graphs of functions.









Example 6	Equations That Define Functions

Do the following equations define y as a function of x?

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

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

Homework

Due:_____

2 – 24 (even), 38 – 50 (even), 56, 62 – 72 (even)