

Calculus-1 (Bridge Course) 2020-2021
Complementary Course for B.Sc Chemistry/Physics

DEFINITION Function

A **function** from a set D to a set Y is a rule that assigns a *unique* (single) element $f(x) \in Y$ to each element $x \in D$.

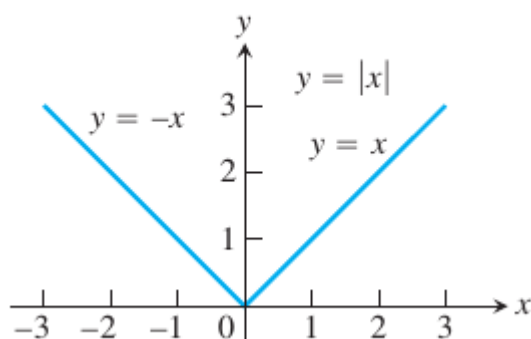
Sketching a Graph

Graph the function $y = x^2$ over the interval $[-2, 2]$.

Piecewise-Defined Functions

Sometimes a function is described by using different formulas on different parts of its domain. One example is the **absolute value function**

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0, \end{cases}$$



Graph the function:

$$f(x) = \begin{cases} -x, & x < 0 \\ x^2, & 0 \leq x \leq 1 \\ 1, & x > 1 \end{cases}$$

Definition:

The function whose value at any number x is the *greatest integer less than or equal to* x is called the **greatest integer function** or the **integer floor function**. It is denoted $\lfloor x \rfloor$, or, in some books, $[x]$ or $[[x]]$ or $\text{int } x$.

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Definition:

The function whose value at any number x is the *smallest integer greater than or equal to* x is called the **least integer function** or the **integer ceiling function**. It is denoted $\lceil x \rceil$.

In Exercises 1–6, find the domain and range of each function.

1. $f(x) = 1 + x^2$

2. $f(x) = 1 - \sqrt{x}$

3. $F(t) = \frac{1}{\sqrt{t}}$

4. $F(t) = \frac{1}{1 + \sqrt{t}}$

5. $g(z) = \sqrt{4 - z^2}$

6. $g(z) = \frac{1}{\sqrt{4 - z^2}}$

Graph the following functions:

$$f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2 - x, & 1 < x \leq 2 \end{cases}$$

$$g(x) = \begin{cases} 1 - x, & 0 \leq x \leq 1 \\ 2 - x, & 1 < x \leq 2 \end{cases}$$

$$F(x) = \begin{cases} 3 - x, & x \leq 1 \\ 2x, & x > 1 \end{cases}$$

$$G(x) = \begin{cases} 1/x, & x < 0 \\ x, & 0 \leq x \end{cases}$$

Find a formula for each function graphed.

