

Piecewise-Defined Function

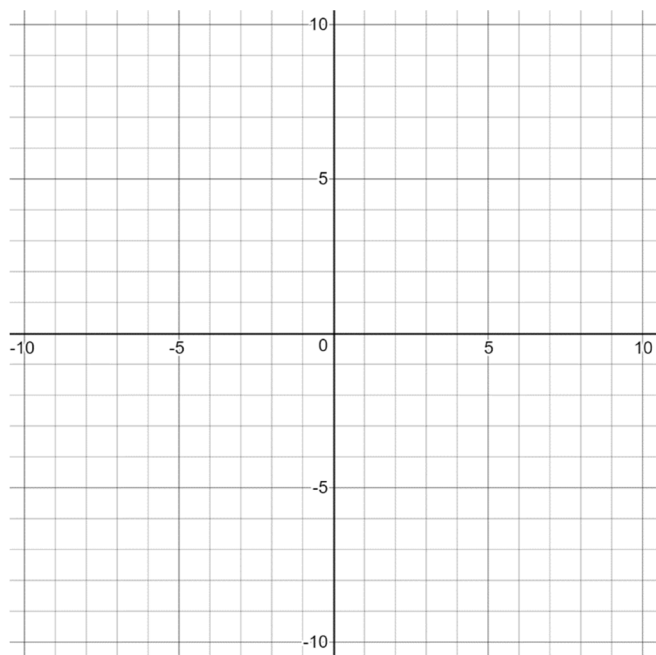
A *piecewise-defined function* is a function that is defined by two or more equations over a specified domain.

Example 1

$$\text{Let } f(x) = \begin{cases} x^2 + 1, & x < 0 \\ x - 1, & x \geq 0. \end{cases}$$

(a) Evaluate $f(-3)$ and $f(0)$.

(b) Graph $f(x)$.

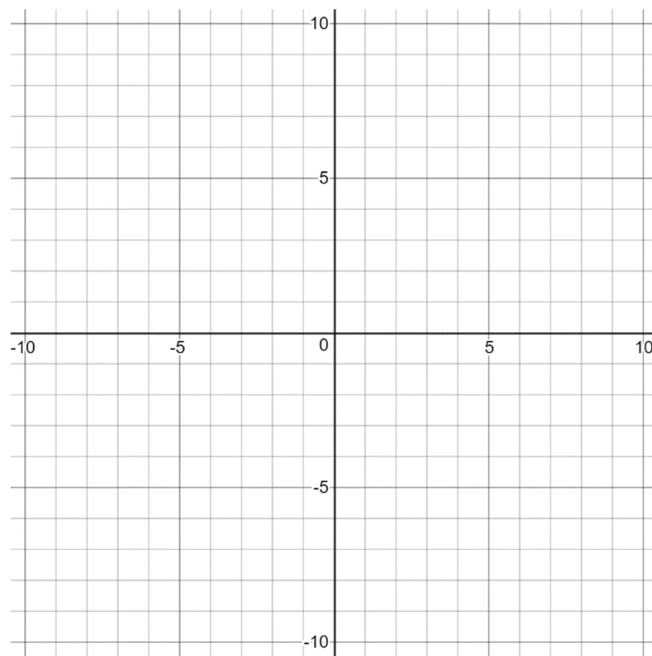


(c) Solve the equation $f(x) = 5$.

Example 2

$$\text{Let } f(x) = \begin{cases} 5 - x, & x \leq -3 \\ 3^{x+2}, & -3 < x \leq 1 \\ 4 - x^2, & x > 1. \end{cases}$$

(a) Graph $f(x)$.



(b) Solve the equation $f(x) = 3$.

Absolute Value Function

The *absolute value function* given by $f(x) = |x|$ can be rewritten as a piecewise-defined function.

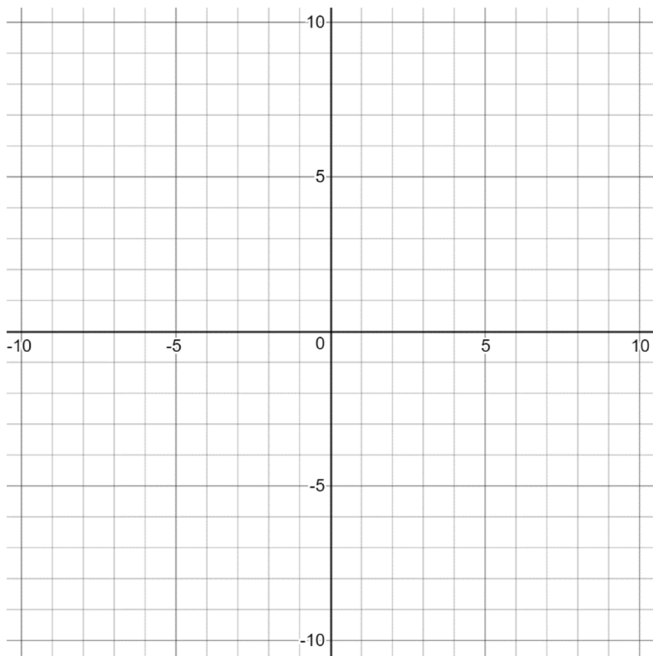
$$f(x) = |x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

Example 3

Let $f(x) = |x|$.

(a) Evaluate $f(-1)$ and $f(2)$.

(b) Graph $f(x)$.

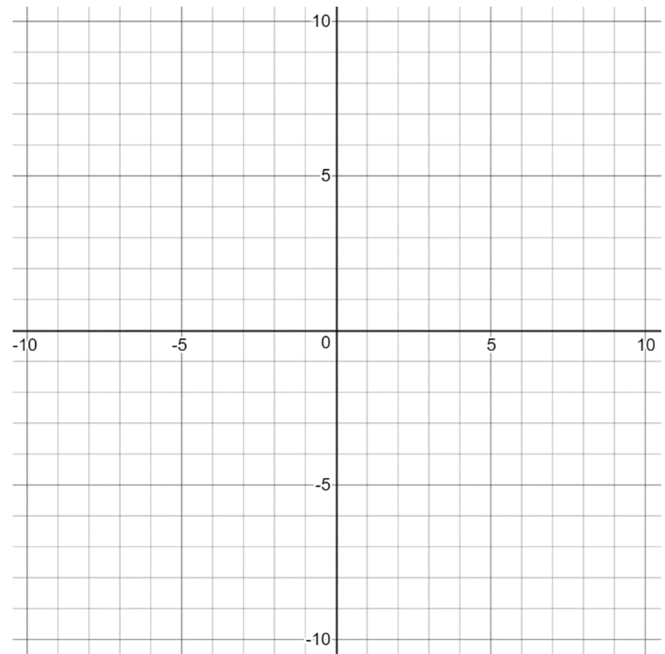


(c) Solve the equation $f(x) = 5$.

Example 4

Let $f(x) = |3 - 2x|$.

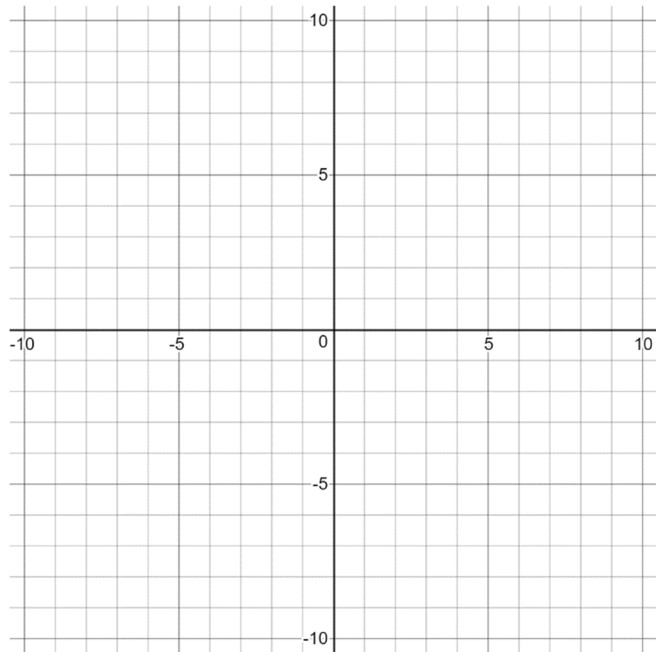
(a) Graph $f(x)$.



(b) Solve the equation $f(x) = 2$.

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

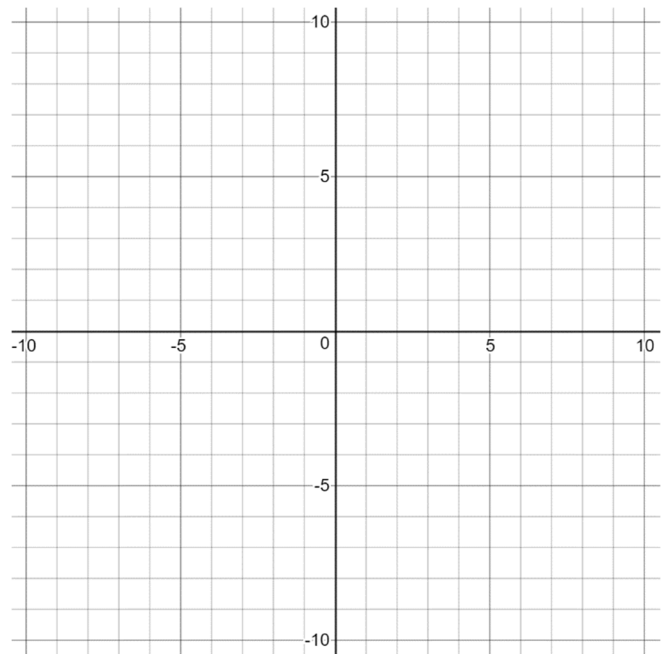
(a) Graph $f(x)$.



(b) Solve the equation $f(x) = 6$.

2. Let $f(x) = \begin{cases} x + 2, & x < 0 \\ \frac{3}{x + 1}, & 0 \leq x < 2 \\ x^2 + 1, & x \geq 2. \end{cases}$

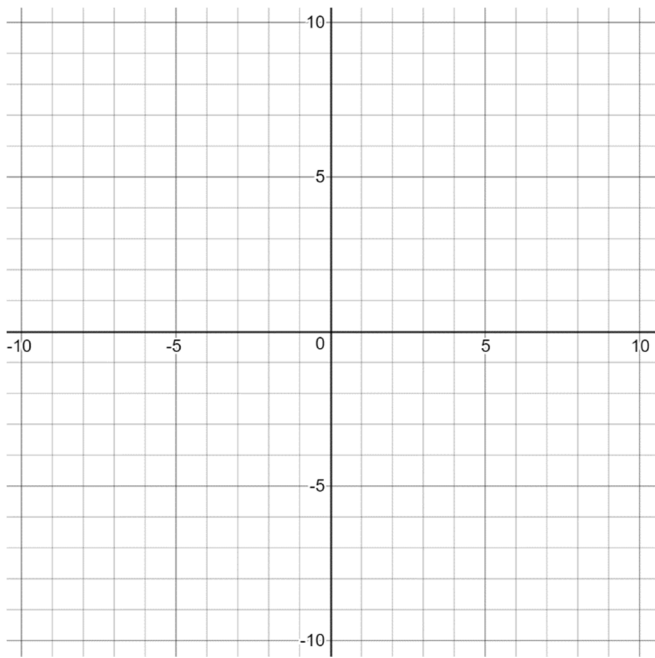
(a) Graph $f(x)$.



(b) Solve the equation $f(x) = 2$.

3. Let $f(x) = |2x + 5|$.

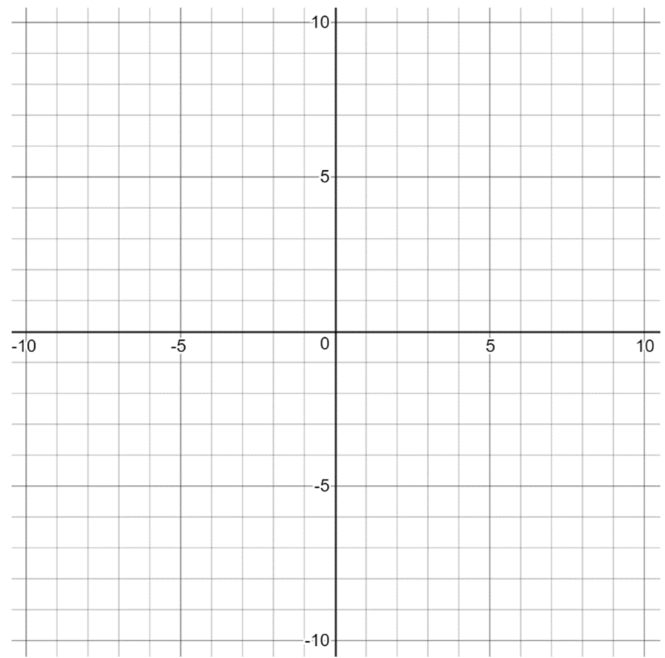
(a) Graph $f(x)$.



(b) Solve the equation $f(x) = 3$.

4. Let $f(x) = |6 - 4x|$.

(a) Graph $f(x)$.



(b) Solve the equation $f(x) = 2$.