

3.3B Piecewise-Defined Functions

▼ Definition of a piecewise-defined function

A **piecewise-defined function** is a function that uses more than one equation to define the function. Pieces of each equation are used to develop a rule. The rule consists of the equations and conditions for which to use the equations.

▼ Evaluate a piecewise-defined function

▼ Example 1:

$$f(x) = \begin{cases} x^2 & x < 2 \\ -3x + 12 & x \geq 2 \end{cases}$$

Find $f(0)$, $f(2)$, and $f(4)$

▼ Example 2:

$$f(x) = \begin{cases} -x + 3 & x \neq -3 \\ 1 & x = -3 \end{cases}$$

Evaluate $f(-5)$, $f(-3)$, and $f(0)$

▼ Find the intercepts of a piecewise-defined function

▼ Example 1:

$$f(x) = \begin{cases} x^2 & x < 2 \\ -3x + 12 & x \geq 2 \end{cases}$$

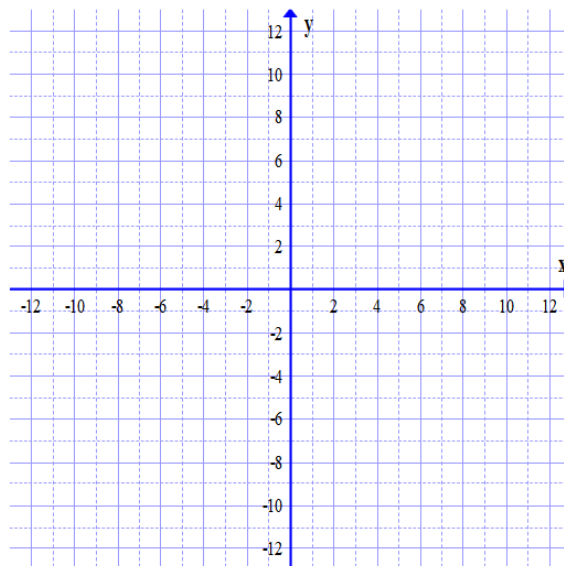
▼ Example 2:

$$f(x) = \begin{cases} -x + 3 & x \neq -3 \\ 1 & x = -3 \end{cases}$$

▼ Sketch a graph of a piecewise-defined function

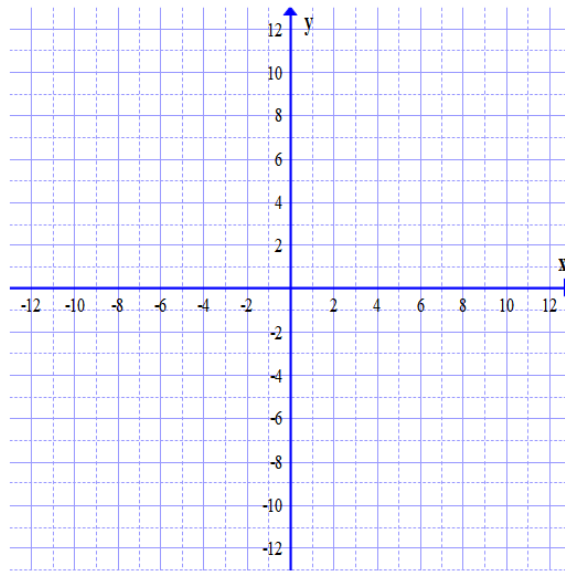
▼ Example 1:

$$f(x) = \begin{cases} x^2 & x < 2 \\ -3x + 12 & x \geq 2 \end{cases}$$



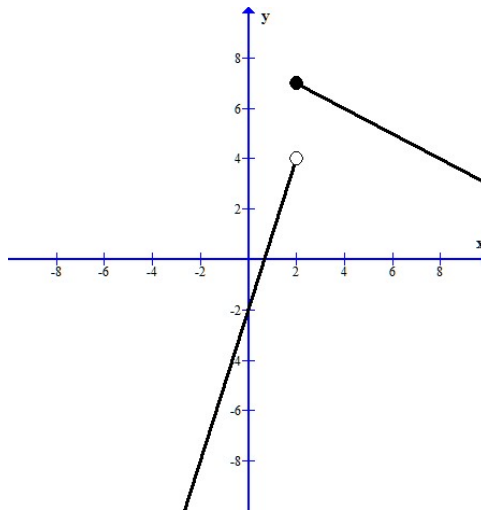
▼ Example 2:

$$f(x) = \begin{cases} -x + 3 & x \neq -3 \\ 1 & x = -3 \end{cases}$$

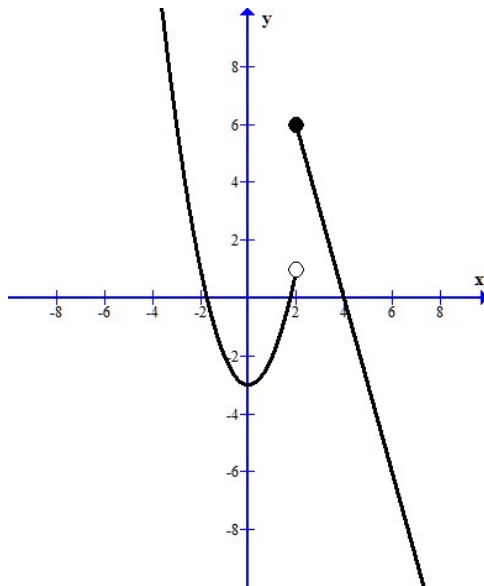


▼ Use a graph to find the rule for a piecewise-defined function

▼ Example 1



▼ Example 2



▼ Solve an application of a piecewise-defined function

▼ Example

On the planet of Sarnun the currency is dollars. In this planet's tax system, a person pays a 5% tax rate on the first \$28,000 earned and a 7% tax rate on everything earned over \$28,000.

- How many dollars in taxes are owed if an individual earns \$15,000?
- How many dollars in taxes are owed if an individual earns \$30,000?
- Find the piecewise-defined function that describes the amount of taxes paid as a function of x dollars are earned.
- Sketch a graph of the piecewise-defined function.