

4.1 Inverse Functions

In a one-to-one function, each x -value corresponds to only _____ y -value, and each y -value corresponds to only _____ x -value.

CLASSROOM EXAMPLE 1 Deciding Whether Functions Are One-to-One

Determine whether each function is one-to-one.

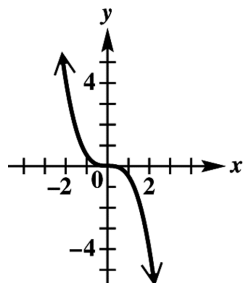
(a) $f(x) = -3x + 7$

(b) $f(x) = \sqrt{49 - x^2}$

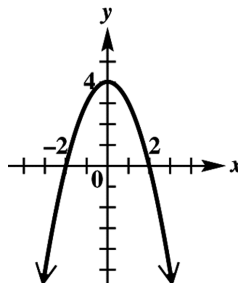
CLASSROOM EXAMPLE 2 Using the Horizontal Line Test

Determine whether each graph is the graph of a one-to-one function.

(a)



(b)



Inverse Functions

CLASSROOM EXAMPLE 3 Deciding Whether Two Functions are Inverses

Let functions f and g be defined respectively by

$$f(x) = 2x + 5 \quad \text{and} \quad g(x) = \frac{1}{2}x - 5.$$

Is g the inverse function of f ?

CLASSROOM EXAMPLE 5 Finding Equations of Inverses

Determine whether each equation defines a one-to-one function. If so, find the equation of the inverse.

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

(b) $g(x) = 4x - 7$

(c) $h(x) = x^3 + 5$

(d) $k(x) = 2^x$

CLASSROOM EXAMPLE 6 Finding the Equation of the Inverse of a Rational Function

The following rational function is one-to-one. Find its inverse.

$$f(x) = \frac{-3x+1}{x-5}, x \neq 5$$