

4.17

Inverse of a One-to-One Function

• Example 1

Find the inverse g^{-1} of the function

$$g(x) = \frac{-5x - 8}{-7x - 1}$$

defined for every real number x such that $-7x - 1 \neq 0$.

If g^{-1} is the inverse of the function g , we must have, for any pair of numbers x and y ,

$$g(x) = y \text{ if and only if } g^{-1}(y) = x.$$

Thus, to find the inverse g^{-1} , we write

$$g(x) = \frac{-5x - 8}{-7x - 1} = y$$

and solve for x .

Multiplying both sides of the last equation by $-7x - 1$, we obtain

$$-5x - 8 = y(-7x - 1).$$

Gathering the terms in x gives

$$(7y - 5)x = -y + 8,$$

and thus finally, for any y such that $7y - 5 \neq 0$

$$x = g^{-1}(y) = \frac{-y + 8}{7y - 5}$$

• • • CHECK YOURSELF 1

Find the inverse f^{-1} of the function.

$$f(x) = 2x - 2$$

• • • CHECK YOURSELF ANSWER

1. $f^{-1}(x) = \frac{1}{2}x + 1.$

4.17 Exercises

Name _____

Section _____

Date _____

A N S W E R S

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

If $h(x) = 2x + 8$, find each of the following

1. $h(4)$

2. $h^{-1}(4)$

3. $h(h^{-1}(4))$

4. $h^{-1}(h(4))$

5. $h(h^{-1}(x))$

6. $h^{-1}(h(x))$