

## GUIDED NOTES – 3.7 INVERSE FUNCTIONS

### LEARNING OBJECTIVES

In this section, you will:

- Verify inverse functions.
- Determine the domain and range of an inverse function, and restrict the domain of a function to make it one-to-one.
- Find or evaluate the inverse of a function.
- Use the graph of a one-to-one function to graph its inverse function on the same axis.

### VERIFYING THAT TWO FUNCTIONS ARE INVERSE FUNCTIONS

Study the box in your textbook section titled “inverse function.”

- For any one-to-one function  $f(x) = y$ , a function  $f^{-1}(x)$  is an \_\_\_\_\_ of  $f$  if \_\_\_\_\_ . This can also be written as \_\_\_\_\_ for all  $x$  in the domain of  $f$ .

\* Remember that  $f^{-1}(x) \neq \frac{1}{f(x)}$ .

**Try It:** Read Example 1 in the text, then answer the following.

Given that  $h^{-1}(6) = 2$ , what are the corresponding input and output values of the original function  $h$ ?

- Write out the 2 step process for testing whether the functions are inverses of each other, given two functions  $f(x)$  and  $g(x)$ .

1.

2.

**Try It:** Read Example 2 in the text, then answer the following.

If  $f(x) = x^3 - 4$  and  $g(x) = \sqrt[3]{x + 4}$ , is  $g = f^{-1}$ ?

**Try It:** Read Example 3 in the text, then answer the following.

If  $f(x) = (x - 1)^3$  and  $g(x) = \sqrt[3]{x} + 1$ , is  $g = f^{-1}$ ?

### **FINDING THE DOMAIN AND RANGE OF INVERSE FUNCTIONS**

- When a function has no inverse function, it is possible to create a new function where that new function on a \_\_\_\_\_ does have an inverse function.

*Study the box in your textbook section titled “domain and range of inverse functions.”*

- The range of a function  $f(x)$  is the \_\_\_\_\_ of the inverse function  $f^{-1}(x)$ .
- The \_\_\_\_\_ of a function  $f(x)$  is the range of the inverse function  $f^{-1}(x)$ .
- Write out the 2 step process for finding the domain and range of its inverse, given a function.
  - 1.
  - 2.

**Try It:** Read Example 4 in the text, then answer the following.

The domain of function  $f$  is  $(1, \infty)$  and the range of the function  $f$  is  $(-\infty, -2)$ . Find the domain and range of the inverse function.

### **FINDING AND EVALUATING INVERSE FUNCTIONS**

**Try It:** Read Example 5 in the text, then answer the following.

Using **Table 4**, find and interpret **a.**  $f(60)$  and **b.**  $f^{-1}(60)$ .

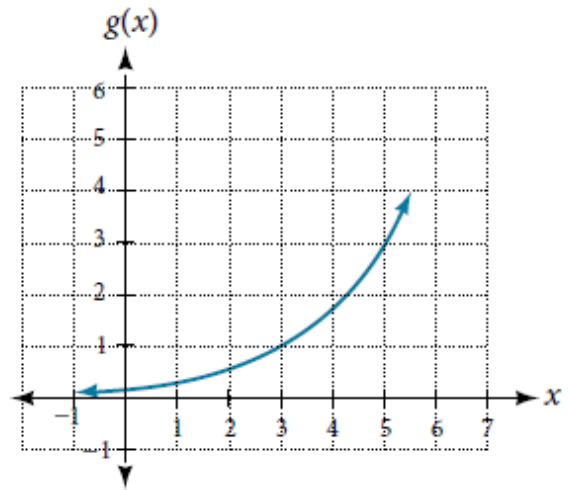
$t$ (minutes)	30	50	60	70	90
$f(t)$ (miles)	20	40	50	60	70

Table 4

- Write out the 2 step process for evaluating its inverse at specific points, given the graph of a function.
  - 1.
  - 2.

**Try It:** Read Example 6 in the text, then answer the following.

Using the graph in **Figure 5**, **a.** find  $g^{-1}(1)$ , and **b.**  $g^{-1}(4)$ .



**Figure 5**

**Homework:** You should now be ready to attempt problems 1-4 in “Homework – Section 3.7” on WeBWork.

- Write out the 3 step process for finding the inverse, given a function represented by a formula.

1.

2.

3.

**Try It:** Read Example 7 in the text, then answer the following.

Solve for  $x$  in terms of  $y$  given  $y = \frac{1}{3}(x - 5)$

**Try It:** Read Examples 8 and 9 in the text, then answer the following.

What is the inverse of the function  $f(x) = 2 - \sqrt{x}$ ? State the domains of both the function and the inverse function.

**Homework:** You should now be ready to attempt problems 7-8 in “Homework – Section 3.7” on WeBWork.

### **FINDING INVERSE FUNCTIONS AND THEIR GRAPHS**

- What is the distinct relationship that we observe between the graphs of functions and their inverses for all one-to-one functions?