

## GUIDED NOTES – 6.1 EXPONENTIAL FUNCTIONS

### LEARNING OBJECTIVES

In this section, you will:

- Evaluate exponential functions.
- Find the equation of an exponential function.
- Use compound interest formulas.
- Evaluate exponential functions with base  $e$ .

### IDENTIFYING EXPONENTIAL FUNCTIONS

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

- For any real number  $x$ , an exponential function is a function with the form

$$f(x) = \underline{\hspace{2cm}}$$

- $a$  is known as the  $\underline{\hspace{2cm}}$
- $b$  is a positive real number such that  $b \underline{\hspace{1cm}} 1$
- The domain of  $f$  is  $\underline{\hspace{2cm}}$
- The range of  $f$  is all positive numbers if  $a \underline{\hspace{1cm}} 0$  or all negative numbers if  $a \underline{\hspace{1cm}} 0$
- The  $y$ -intercept is  $\underline{\hspace{2cm}}$ , and the horizontal asymptote is  $y = \underline{\hspace{2cm}}$

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

Which of the following equations represent exponential functions?

a.  $f(x) = 2x^2 - 3x + 1$

b.  $g(x) = 0.875^x$

c.  $h(x) = 1.75x + 2$

d.  $j(x) = 1095.6^{-2x}$

## EVALUATING EXPONENTIAL FUNCTIONS

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

Let  $f(x) = 8(1.2)^{x-5}$ . Evaluate  $f(3)$  using a calculator. Round to four decimal places.

*Study the box in your textbook section titled “exponential growth.”*

- For any real number  $x$  and any positive real numbers  $a$  and  $b$  such that  $b \neq 1$ , an exponential growth function has the form

$$f(x) = \underline{\hspace{2cm}}, \text{ where}$$

$a$  is the                      or                      value of the function

$b$  is the growth                      or growth                      per unit  $x$

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

The population of China was about 1.39 billion in the year 2013, with an annual growth rate of about 0.6%. This situation is represented by the growth function  $P(t) = 1.39(1.006)^t$ , where  $t$  is the number of years since 2013. To the nearest thousandth, what will the population of China be for the year 2031?

## FINDING EQUATIONS OF EXPONENTIAL FUNCTIONS

- Write out the 3 step process for writing an exponential model, given two data points.

1.

2.

3.

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

A wolf population is growing exponentially. In 2011, 129 wolves were counted. By 2013, the population had reached 236 wolves. What two points can be used to derive an exponential equation modeling this situation? Write the equation representing the population,  $N$ , of wolves over time,  $t$ .

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

Given the two points (1,3) and (2, 4.5), find the equation of the exponential function that passes through these two points.

- Write out the 4 step process for writing the equation, given the graph of an exponential function.

1.

2.

3.

4.

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

Find the equation for the exponential function graphed in **Figure 6**.

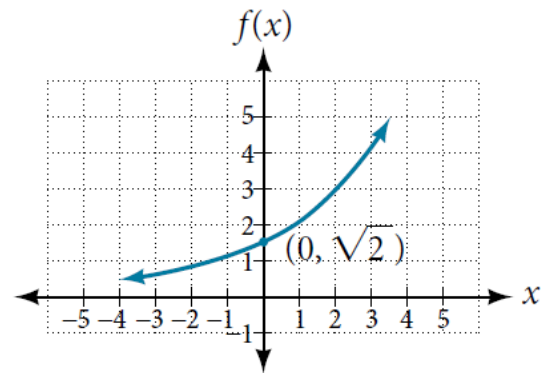


Figure 6

### APPLYING THE COMPOUND-INTEREST FORMULA

Study the box in your textbook section titled “the compound interest formula.”

- Write the formula that is used to calculate compound interest below.

$$A(t) = \underline{\hspace{2cm}}$$

$A(t)$  is the \_\_\_\_\_

$t$  is measured in \_\_\_\_\_

$P$  is the starting amount, often called \_\_\_\_\_ or \_\_\_\_\_

$r$  is the \_\_\_\_\_ rate (APR) expressed as a decimal

$n$  is the number of \_\_\_\_\_ periods in one year

**Try It:** Read Example 8 in the text, then answer the following.

An initial investment of \$100,000 at 12% interest is compounded weekly (use 52 weeks in a year). What will the investment be worth in 30 years?

**Try It:** Read Example 9 in the text, then answer the following.

Refer to **Example 9**. To the nearest dollar, how much would Lily need to invest if the account is compounded quarterly?

### EVALUATING FUNCTIONS WITH BASE $e$

*Study the box in your textbook section titled “the number  $e$ .”*

- Write the irrational number that the letter  $e$  represents.

\_\_\_\_\_ , as  $n$  increases without bound

- The approximation of  $e$  is  $e \approx$  \_\_\_\_\_.

**Try It:** Read Example 10 in the text, then answer the following.

Use a calculator to find  $e^{0.5}$ . Round to five decimal places.

### INVESTIGATING CONTINUOUS GROWTH



- a.
- b.
- 3.
- 4.

**Try It:** Read Example 11 in the text, then answer the following.

A person invests \$100,000 at a nominal 12% interest per year compounded continuously. What will be the value of the investment in 30 years?

**Try It:** Read Example 12 in the text, then answer the following.

Using the data in **Example 12**, how much radon-222 will remain after one year?