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 $b \underline{\hspace{0.8cm}} 1$

- The domain of f is $\underline{\hspace{3cm}}$

- 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 $y = \underline{\hspace{1.5cm}}$

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

Homework: *You should now be ready to attempt problem 1 in "Homework – Section 6.1" on WeBWorK.*

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 $\underline{\hspace{3cm}}$ or $\underline{\hspace{3cm}}$ value of the function

b is the growth $\underline{\hspace{2cm}}$ or growth $\underline{\hspace{3cm}}$ 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 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.

Homework: *You should now be ready to attempt problems 6-7 in "Homework – Section 6.1" on WeBWorK.*

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

    1.

    2.

    3.

    4.

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?

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

Study the box in your textbook section titled "the continuous growth/decay formula."

- For all real numbers t, and all positive numbers a and r, continuous growth or decay is represented by the formula

$$A(t) = \underline{\hspace{1cm}} , \text{ where}$$

a is the _____ value

r is the _____ growth rate per unit time

t is the _____

When does the formula represent growth and when does it represent decay?

- For business applications, the continuous growth formula is called the _____

  formula and takes the form

$$A(t) = \text{_____}, \text{ where}$$

  P is the _____ or the _____

  r is the growth or _____ rate per time unit

  t is the _____ or _____ of investment

Homework: *You should now be ready to attempt problems 2-5 in "Homework – Section 6.1" on WeBWorK.*

- Write out the 4 step process for solving a continuous growth or decay function, given the initial value, rate of growth or decay, and time, t.

  1.

  2.

      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?