GUIDED NOTES – 6.6 EXPONENTIAL AND LOGARITHMIC EQUATIONS

LEARNING OBJECTIVES

In this section, you will:

- Use like bases to solve exponential equations.
- Use logarithms to solve exponential equations.
- Use the definition of a logarithm to solve logarithmic equations.
- Use the one-to-one property of logarithms to solve logarithmic equations.
- Solve applied problems involving exponential and logarithmic equations.

USING LIKE BASES TO SOLVE EXPONENTIAL EQUATIONS

- Write out the 3 step process for solving for an unknown, given an exponential equation with the form $b^S = b^T$, where S and T are algebraic expressions with an unknown.

  1.

  2.

  3.

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

Solve $5^{2x} = 5^{3x+2}$.

- Write out the 4 step process for using the one-to-one property to solve it, given an exponential equation with unlike bases.

  1.

  2.

  3.

4.

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

Solve $5^{2x} = 25^{3x+2}$.

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

Solve $5^{x} = \sqrt{5}$.

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

Solve $2^{x} = -100$.

SOLVING EXPONENTIAL EQUATIONS USING LOGARITHMS

- Write out the 2 step process for solving for an unknown, given an exponential equation in which a common base cannot be found.

1.

a.

b.

2.

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

Solve $2^x = 3^{x+1}$.

- Write out the 3 step process for solving for t, given an equation if the form $y = Ae^{kt}$.

1.

2.

3.

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

Solve $3e^{0.5t} = 11$.

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

Solve $3 + e^{2t} = 7e^{2t}$.

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

Solve $e^{2x} = e^{x} + 2$.

USING THE DEFINITION OF A LOGARITHM TO SOLVE LOGARITHMIC EQUATIONS

Study the box in your textbook section titled "using the definition of a logarithm to solve logarithmic equations".

- For any algebraic expression S and real numbers b and c, where $b > 0, b \neq 1$,

$$\log_b(S) = \_\_\_ \text{ if and only if } b^c = \_\_\_$$

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

Solve $6 + \ln(x) = 10$.

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

Solve $2\ln(x + 1) = 10$.

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

Use a graphing calculator to estimate the approximate solution to the logarithmic equation $2^x = 1000$ to 2 decimal places.

USING THE ONE-TO-ONE PROPERTY OF LOGARITHMS TO SOLVE LOGARITHMIC EQUATIONS

Study the box in your textbook section titled "using the one-to-one property of logarithms to solve logarithmic equations".

- For any algebraic expression S and any positive real number b, where $b \neq 1$,

$$\log_b(S) = \_\_\_\_\_ \text{ if and only if } S = \_\_\_\_\_$$

- Write out the 3 step process for solving an equation using the one-to-one property, given an equation containing logarithms.

1.

2.

3.

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

Solve $\ln(x^2) = \ln(1)$.

SOLVING APPLIED PROBLEMS USING EXPONENTIAL AND LOGARITHMIC EQUATIONS

Try It: Read Example 13 in the text, then answer the following.

Use the information in ***Example 13*** *for this problem*. How long will it take before twenty percent of our 1,000-gram sample of uranium-235 had decayed?