Concepts
Logarithmic Equations in One Variable

Based on power point presentations by Pearson Education, Inc.
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Learning Objectives

1. Solve logarithmic equations in which not all terms are logarithms.
2. Solve logarithmic equations in which ALL terms are logarithms.

NOTE: This lesson contains some examples. You can find more examples in the "Examples" document also located in the appropriate MOM Learning Materials folder.

1. Solve Logarithmic Equations in which not all Terms are Logarithms

Strategy for solving logarithmic equations in which not all terms are logarithms:

a. If necessary, use the logarithm rules to achieve a single logarithm on one side of the equal sign with coefficient **1**. The other side will contain non-logarithm terms.

   Example 1: Given $2\log_2 x + \log_2 (x + 1) = 3$, we use the Power Rule and the Product Rule to write $\mathbf{1}\log_2 (x^2 (x + 1)) = 3$

b. Rewrite the logarithmic equation in exponential form.

   Example 1 continued: $x^2 (x + 1) = 2^3$

c. Solve for the variable. There can be one or more "proposed" solutions. Sometimes there might be no solutions.

d. Check the proposed solutions. Those that cause all logarithm arguments to be greater than 0 (positive) are the TRUE solutions.

2. Solve Logarithmic Equations in which ALL Terms are Logarithms

Strategy for solving logarithmic equations in which ALL terms are logarithms:

a. If necessary, use the logarithm rules to achieve a single logarithm on the right side and the left side of the equal sign. Their coefficient must be **1**.

   Example 2: Given $2\log_2 x + log_2 (x + 1) = \log_2 (3x - 4)$, we use the Power Rule and Product Rule to write $\mathbf{1}\log_2 (x^2 (x + 1)) = \mathbf{1}\log_2 (3x - 4)$

b. Set the arguments equal.

   Example 2 continued: $x^2 (x + 1) = 3x - 4$

c. Solve for the variable. There can be one or more "proposed" solutions. Sometimes there might be no solutions.

d. Check the proposed solutions. Those that cause all logarithm arguments to be greater than 0 (positive) are the TRUE solutions.