Exponential and Logarithmic Equations

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One-to-one Property for Exponential Functions

If $b^x = b^y$, then $x = y$. 
Example 1

Solve the equation.

$3^{4x+1} = 81$
Solve the equation.

\[ 4^{3x-1} = 8^{x+5} \]
One-to-one Property for Logarithmic Functions

If \( x = y \) and \( x > 0 \), then \( \log_b x = \log_b y \).
Example 3

Solve the equation.

\[ 7^{x-3} = 21 \]
Example 4

Solve the equation.

\[4^{2x-3} = 5^{3x+4}\]
Example 5

Solve the equation.

\[ e^{2x+5} = 18 \]
Example 6

Solve the equation.

\[ e^{2x} - e^x - 6 = 0 \]
Example 7

Solve the equation.

\[ \log_3(x + 3) = 2 \]
Example 8

Solve the equation.

\[ \ln(x + 7) = 4 \]
Example 9

Solve the equation.

\[ \log_2(x - 5) + \log_2(x + 2) = 3 \]
If $\log_b x = \log_b y$ and $x > 0$ and $y > 0$, then $x = y$. 
Example 10

Solve the equation.

\[ \ln(x + 3) - \ln x = \ln 7 \]