Unit 2 Day 3: Solving Exponential Equations

This is what we've been working towards! We are going to solve equations that have the variables in the exponent.

Steps

1. Isolate the exponential term
2. Take the ln (or log.. but most people use ln!) of both sides!
3. Use the exponent property
4. Solve for the variable and round to the hundredths place (2 places)

Ex 1) Solve $7^x = 39$

$\ln 7^x = \ln 39$

$x \ln 7 = \ln 39$

$\frac{x \ln 7}{\ln 7} = \frac{\ln 39}{\ln 7}$

$x = 1.88$

Ex 2) Solve $6^{2x} = 27$

$\ln 6^{2x} = \ln 27$

$2x \ln 6 = \ln 27$

$\frac{2x \ln 6}{\ln 6} = \frac{\ln 27}{\ln 6}$

$\frac{2x}{2} = \frac{1.84}{2}$

$x = .92$

Ex 3) Solve $e^{5x} = 32$

$\ln e^{5x} = \ln 32$

$\frac{5x}{5} = \frac{\ln 32}{5}$

$x = .69$

Ex 3) Solve $11^{3x} - 51 = 2$

$+51 \quad +51$

$11^{3x} = 53$

$\ln 11^{3x} = \ln 53$

$3x \ln 11 = \ln 53$

$\frac{3x \ln 11}{\ln 11} = \frac{\ln 53}{\ln 11}$

$\frac{3x}{3} = \frac{1.66}{3}$

$x = .55$

Ex 4) Solve $5 \cdot 2^x - 1 = 34$

$+1 \quad +1$

$\frac{5 \cdot 2^x}{5} = \frac{35}{5}$

$2^x = 7$

$\ln 2^x = \ln 7$

$x \ln 2 = \ln 7$

$\frac{x \ln 2}{\ln 2} = \frac{\ln 7}{\ln 2}$

$x = 2.81$

You try

1. Solve $3 \cdot 12^x = 39$ $x = 1.03$

2. Solve $7^{4x} = 65$ $x = .54$

3. Solve $\frac{1}{2} \cdot 5^{6x} - 3 = 9$ $x = .33$

4. Solve $(\frac{1}{5})^{3x} = 44$ $x = -.78$

5. Solve $e^{4x} + 1 = 6$ $x = .4$

6. Solve $3e^x = 45$ $x = 2.71$