Example 5

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Try It!

5. Solve each equation. Round to the nearest thousandth.

a. $\log(3x - 2) = 2$

$10^2 = 3x - 2$

$x = 34$

b. $e^{x+2} = 8$

$\ln 8 = x + 2$

$x = 0.079$

Hwk #9 Sec 6-3

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Due tomorrow

Problems 23, 24, 29, 30, 34, 36, 45, 46, 48

How would you solve this equation?

$5^x = 42$

1st: Rewrite as a logarithm.

$\log_5 42 = x$

Now that the exponential eq is a logarithmic eq:

$5^x = 42 \longrightarrow \log_5 42 = x$

Now use change of base formula in order to have either Common Logs or Natural Logs.

Change of Base Formula:

$$\log_b m = \frac{\log_a m}{\log_a b}$$

Applying the change of base formula:

$\log_5 42 = x$

$x = \log_5 42 = \frac{\log 42}{\log 5}$ or $\frac{\ln 42}{\ln 5}$

$x = 2.32$

Another technique to solve: $5^x = 42$

Remember, what you do to one side of an equation you must do to the other side.

Take the logarithm of both sides of the equation.

$\text{Log}5^x = \text{Log}42$

Now apply one of the Properties of Logarithms:

$\log_b m^n = n \log_b m$ ..... Power Property of Logarithms

The exponent inside of a Log becomes the coefficient of the Log.

$\text{Log}5^x = \text{Log}42 \longrightarrow x\frac{\log 5}{\log 5} = \frac{\log 42}{\log 5}$

$x = \frac{\log 42}{\log 5}$

$x = 2.32$

Solve each to the nearest hundredth.

1. $9^x = 250$

$\log_9 250 = x$

$x = \frac{\log 250}{\log_9}$

$x = 2.51$

2. $2(6)^x + 5 = 111$

$-5 \quad -5$

$\frac{2(6)^x}{2} = \frac{106}{2}$

$6x = 53$

$\log_6 53 = x$

$x = \frac{\log 53}{\log 6}$

$x = 2.22$

Solve each to the nearest hundredth.

3. $4(3)^{2x-1} + 8 = 102$

$-8 \quad -8$

$\frac{4(3)^{2x-1}}{4} = \frac{94}{4}$

$3^{2x-1} = 23.5$

$\log_3 23.5 = 2x-1$

$2x-1 = \frac{\log 23.5}{\log 3}$

after finding you'll add 1 then $\div 2$

$x = 1.94$

4. $5e^{x+3} - 6 = 72$

$+6 \quad +6$

$\frac{5e^{x+3}}{5} = \frac{78}{5}$

$e^{x+3} = 15.6$

$\ln 15.6 = x+3$

$x = \ln 15.6 - 3$

$x = -0.25$

Solve each to the nearest hundredth.

5. $6\log_2(x+7) - 8 = 67$

$+8 \quad +8$

$\frac{6\log_2(x+7)}{6} = \frac{75}{6}$

$\log_2(x+7) = 12.5$

$2^{12.5} = x+7$

$x = 2^{12.5} - 7$

$x = 5785.62$

6. $2\ln(2x-1) + 3 = 15$

$-3 \quad -3$

$\frac{2\ln(2x-1)}{2} = \frac{12}{2}$

$\ln(2x-1) = 6$

$e^6 = 2x-1$

$x = \frac{e^6+1}{2}$

$x = 202.21$

Solving a previous bellwork question:

You invest $40,000 in an account that pays 8% annual interest. If the interest is compounded annually find the number of years, to the nearest tenth, it will take for your investment to reach $100,000.

$= 40000\left(1 + \frac{.08}{1}\right)^{1 \cdot t}$

$\frac{100000}{40,000} = \frac{40000(1.08)^t}{40000}$

$2.5 = 1.08^t$

$\log_{1.08} 2.5 = t$

$t = 11.9$