# Warm Up

- File all paperwork
- Organize binder
- Fill in any missing notes or work

1. Condense the expression to a single logarithm: $\ln(3) + 2\ln(4 - x^2) - \ln(x)$

alculator Inactive

2. For each of the following functions, identify the following characteristics.

   a. $f(x) = \left(\frac{1}{2}\right)^{x-1} - 1$

   Domain: _____

   Range: _____

   Asymptote: _____

   y-intercept: _____

   Transformations: _____

   _____

   End Behavior: _____

   _____

   b. $g(x) = -5 \cdot 2^{x-2} + 3$

   Domain: _____

# Announcements

- DON'T PROCRASTINATE!!!!!

## Solving for Unknown Exponents

You are going to be asked on the NCFE questions like, "How much ***time*** does it take to earn $1000 if the rate is 4%, and initial investment is $500 when compounded continuously?"

Condense logs

**Solving**

Example 1: $\log_2 x + \log_2 (x-2) = 3$

$\log_2 x(x-2) = 3$

Exponentiation →

$2^{\log_2 x(x-2)} = 2^3$

$x(x-2) = 8$

$x = 8$

$x - 2 = 8$

$x = 10$

# Logarithmic Equations

Example 2: $\log_{10} 4 + \log_{10} w = 2$

$\log_{10} 4w = 2$

$10^{\log_{10} 4w} = 10^2$

$4w = 100$

$\boxed{w = 25}$

Example 3: $\frac{4\ln(2x+3)}{4} = \frac{8}{4}$

Ln and $e^x$ are inverses

$Lnx \leftrightarrow e^x$

$\ln(2x+3) = 2$

$e^{\ln}(2x+3) = e^2$

$2x+3 = 7.39$

$2x = 4.39$

$x = 2.195$

Example 4: $\log_9(3u + 14) - \log_9 5 = \log_9 2u$

$$\cancel{\log_9}\ \frac{3u+14}{5} = \cancel{\log_9}\ 2u$$

logs on both sides cancel out

$$\cancel{5} \cdot \frac{3u+14}{\cancel{5}} = 2u \cdot 5$$

$$3u + 14 = 10u$$

$$14 = 7u$$

$$\boxed{2 = u}$$

# Review - Exponentiation

(2) $\log_5 x + \log_5 3x = 2$

$\log_5 x^2 \oplus \log_5 3x = 2$

$3x \cdot 1x^2$
$3x^{1+2}$
$3x^3$

$\log_5 3x^3 = 2$

$5^{\log_5 3x^3} = 5^2$

$3x^3 = 25$

$x^3 = \frac{25}{3}$

$x = \sqrt[3]{\frac{25}{3}} = 2.02$

calc: → MATH → 4: $\sqrt[3]{x}$

Example 1: $2^{x-3} = 32$

$\log_2(x-3) = \log_2 32$

$x - 3 = 5$

$\boxed{x = 8}$

Example 2: $-4(5^x) = -68$

$-4 \quad -4$

$5^x = 17$

$\log_5(x) = \log_5 17$

$x = \log_5 17$

$\boxed{x = 1.76}$

Example 3: $-14 + 3e^x = 11$

$\frac{3e^x}{3} = \frac{25}{3}$

$e^x = \frac{25}{3}$

$\ln e^x = \ln\left(\frac{25}{3}\right)$

$x = 2.12$

Example 4: $5^{3x} = 8^{x-1}$

$\log_8 5(3x) = \log_8 (x-1)$

$\log_5 5(3x) = \log_5 8(x-1)$

$3x = 1.3(x-1)$

$3x = 1.3x - 1.3$

$-1.3x \quad -1.3x$

$1.7x = -1.3$

$x = -.76$

# P-I-G Classwork

- Work with a partner, independently, or in a group
- Check your answers at the Solution Station
- Ask 3 before me

**Fixed Rate**

Growth or decay involving seconds/min/hour (used for compound interest)

$$A = P\left(1 \pm \frac{r}{n}\right)^{nt}$$

**Constant Rate**

Continuous growth or decay (used for radioactive decay and continuously compounded interest)

$$A = Pe^{rt}$$

**Example 11: Rita invests $8000 into a retirement account with a 9% interest rate. How long, to the nearest year, would it take for the account to reach $16,000 if it is**

**a) compounded monthly?**

**b) compounded continuously?**

# Exit Prompt

Analyze the work shown below. Indicate where there was a mistake, fix it, and explain what they should have done correctly.