

## Warm Up

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

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

calculator 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

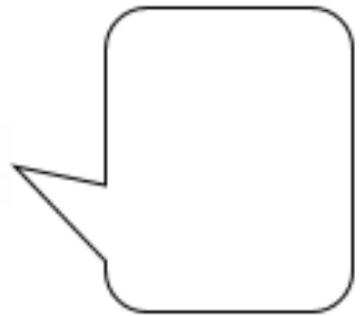
Example 2:  $\log_{10} 4w = 2$

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

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

$$4w = 100$$

$$w = 25$$



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

Ln and  $e^x$  are inverses  
 $\ln x \leftrightarrow e^x$

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

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

$$2x+3 = 7.39$$

$$2x = 4.39$$

$$x = 2.195$$

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

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

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

$$3u + 14 = 10u$$

$$14 = 7u$$

$$\boxed{2 = u}$$

logs on  
both  
sides  
cancel  
out

## Review - Exponentiation

$$\textcircled{2} \log_5 x + \log_5 3x = 2$$

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

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

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

$$3x^3 = 25$$

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

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

$$\begin{aligned} 3x \cdot x^2 \\ 3x^{1+2} \\ 3x^3 \end{aligned}$$

calc: →

**MATH**

→ 4:  $\sqrt[3]{x}$



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

↗

$$\log_2 2^{(x-3)} = \log_2 32$$

$$x-3 = 5$$

$$\boxed{x = 8}$$

Example 2:  $\frac{4(5^x)}{-4} = \frac{-68}{-4}$

$$5^x = 17$$

$$\log_5 5^x = \log_5 17$$

$$x = \log_5 17$$

$$\boxed{x = 1.76}$$

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

$$\log_8 5(3x) = \log_8 8(x-1)$$

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

$$3x = 1.3(x-1)$$

$$3x = 1.3x - 1.3$$

$$\begin{array}{r} -1.3x \quad -1.3x \\ \hline \end{array}$$

$$1.7x = -1.3$$

$$x = -.76$$

## 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.

