3-3 Solving Exponential and Logarithmic equations

Solving Graphically

$$275e^{0.06x} = 1000$$

$y_1 =$ $y_2 =$

Solving Equations Algebraically

-simplify any terms possible without using logarithms

- re-write in logarithmic/exponential form

- use the property of equality for logarithmic equations

Inverses

Addition/Subtraction	Natural Log/e	Common Log/10
$x-5=10$	$e^x=5$	$10^x=100$
$x+7=21$	$\ln x=7$	$\log x=3$

Solve the following equations

A) $10=5e^{4x}$ B) $5^x-4=7$

C) $2e^{x-1}+5=80$ D) $20\left(\frac{1}{2}\right)^{\frac{x}{3}}=5$

How long will it take to triple a $250 initial investment in an account that pays 4.5% compounded quarterly?

Solve the following

A) $\ln(x+12)=3\ln 2$ B) $\log x^4=2$

C) $4\ln(x+7)-5=1$ D) $3-\log(x+2)=5$

Solve the following

A) $\frac{1}{2}\ln(x+3)-\ln x=0$

B) $\log(x-2)+\log(x+7)=3\log 4$

Comparing Earthquake intensities:

On the Richter scale, the magnitude M of an earthquake depends on the amount of energy, E (measured in ergs), released by the earthquake as follows:

$$M=\frac{2}{3}\log\frac{E}{10^{11.8}}$$

How much energy is released in a: 7.4 quake compared to a 5.5 quake?

Comparing acidity: $pH=-\log\left[H^+\right]$

H^+ hydrogen-ion concentration

Sour Vinegar has a pH of 2.4 and a box of Leg and Sickle baking soda has a pH of 8.4.

a) what are their hydrogen-ion concentrations

b) how many times greater is the [H+] of vinegar than baking soda?

c) By how many orders of magnitude do they differ?

Newton's Law of Cooling

$$T(t)=T_s+(T_0-T_s)e^{-kt}$$

This law states that the temperature difference between an object (T) and its surroundings (T_s) decreases exponentially as a function of time (t). Where T_0 is the initial temperature of the object, and $-k$ is our constant of variation representing the constant rate of decrease in the temperature difference.

A cup of cocoa has cooled from 95° to 50° after 13 minutes in a room at 25°. How long will it take for the cup to cool to 30°?