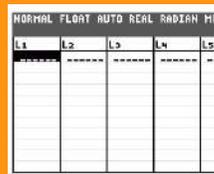


TOPIC 5: EXPONENTIAL REGRESSION EQUATIONS

In this topic, you will be given a table and asked to find the exponential regression equation using your calculator. By inputting the numbers into the calculator, you are able to determine an exponential equation that will best fit the data given.

Follow these steps to perform an **exponential regression** equation using your calculator.

- 1) Press **STAT**, **enter** this takes you to the lists on your calculator, must have L1 and L2 otherwise reset it



- 2) Copy the values given in your table into L1 and L2
- 3) Press **STAT**, move over to **CALC**, press 0
- 4) To transfer the equation into Y1, in Y1 press **VARS #5, EQ**
- 5) Change the window to appropriate values or sometimes ZOOM 0 works

Examples:

1. A cup of soup is left on a countertop to cool. The table below gives the temperatures, in Fahrenheit, of the soup recorded over a 10-minute period.

Time in Minutes	Temperature in Fahrenheit
0	180.2
2	165.8
4	146.3
6	135.4
8	127.7
10	110.5

- a) Write an exponential regression equation for the data, rounding all values to the nearest hundredth.

$$y = 180.38(0.95)^x$$

This represents a 5% rate of decrease.

since $b = 0.95$ this tells us there is a loss or depreciation, to find the rate of decrease

$$1 - i$$

use $1 - 0.95$

$$0.05$$

A **common logarithm** or a logarithm with a base of 10 will be written in the following way:

$$\log_{10} x = \log x$$

- A base of 10 **will not** be written,
but it is assumed you know it is there.

One of the most important concepts when using logarithms is to be able to convert from exponential form to logarithmic form. The formula **given on the formula sheet is**

$y = a^x$	Converts to	$x = \log_a y$
Exponential form		logarithmic form

This is the most important formula in this unit.

An easy way to convert between the two forms is to label each value with the appropriate letter and then write it in the other form given on the formula sheet. However, in order to convert properly, the equation must look **exactly** like the formulas above. If there are any extra numbers in front, we must divide it first.

Examples:

1. Convert from logarithmic form to exponential form.

a) $2 = \log_a 5$

$$5 = a^2$$

b) $\log_m r = 5$

$$r = m^5$$

c) $3 \log_2 x = b$

$$\log_2 x = \frac{b}{3}$$

$$x = 2^{\frac{b}{3}}$$

Must divide first

2. Convert from exponential form to logarithmic form.

a) $x = 10^y$

$$\log_{10} x = y$$

$$\log x = y$$

b) $4^{x-3} = 12$

$$\log_4 12 = x - 3$$

c) $a = 3b^y$

$$\frac{a}{3} = b^y$$

$$\log_b \frac{a}{3} = y$$

Must divide first