

## Quadratic and Exponential Regression

Name: \_\_\_\_\_

Enter the data into your calculator (STAT - ENTER) into  $L_1$  and  $L_2$ . Then use STATPLOT and ZOOM 9 to look at the data (does it look like a linear, quadratic or exponential function). Based on that, use STAT-CALC to find the appropriate regression. Remember for StoReg, go to VARS, Y-Vars, function and choose  $Y_1$  to store the regression equation into  $Y_1$ . Now you can use Graph and Table to interpolate or extrapolate other data points and check to see how well the equation models your data.

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

Time in Minutes ( $x$ )	Temperature in $^{\circ}\text{F}$ ( $y$ )
0	180.2
2	165.8
4	146.3
6	135.4
8	127.7
10	110.5

Write an exponential regression equation for the data, rounding all values to the *nearest thousandth*.

- 3 The accompanying table shows the number of bacteria present in a certain culture over a 5-hour period, where  $x$  is the time, in hours, and  $y$  is the number of bacteria.

$x$	$y$
0	1,000
1	1,049
2	1,100
3	1,157
4	1,212
5	1,271

Write an exponential regression equation for this set of data, rounding all values to *four decimal places*. Using this equation, determine the number of whole bacteria present when  $x$  equals 6.5 hours.

2. The data collected by a biologist showing the growth of a colony of bacteria at the end of each hour are displayed in the table below.

Time, hour, ( $x$ )	Population ( $y$ )
0	250
1	330
2	580
3	800
4	1650
5	3000

Write a regression equation of a best fit to model these data. Round all values to the *nearest thousandth*.

Using your model, estimate, to the *nearest ten*, the number of bacteria in the colony at the end of 7 hours.

4) The table below shows the concentration of a drug in a patient's bloodstream  $t$  hours after it was administered.

time (hours)	0.5	1	1.5	2	2.5	3
concentration (mg/cc)	.16	.19	.2	.19	.18	.17

What type of regression will best model these data?

What is the concentration of the drug at 3.5 hrs?

After how long (to the nearest hour) will there be no trace of the drug in the person's bloodstream?

2) A projectile is fired upwards from the ground. The height of the projectile above the ground is shown in the following table:

Time (seconds)	0	0.5	1	1.5	2	2.5
Height (feet)	0	20.5	31.36	36.25	30.41	23.23

Write a regression equation of best fit to model the data above.

Using your model, predict the height at 3 seconds.



CHALLENGE QUESTION: At what two times is the projectile 10 feet above the ground?