Name: ____ Period: ____________ Date: ___________________

Regressions – Linear, Exponential, Polynomial

1.

Emma recently purchased a new car. She decided to keep track of how many gallons of gas she used on five of her business trips. The results are shown in the table below.

Miles Driven	Number of Gallons Used
150	7
200	10
400	19
600	29
1000	51

Write the linear regression equation for these data where miles driven is the independent variable. (Round all values to the *nearest hundredth*.)

If Emma drives 750 miles on her next business trip, how many gallons of gas should she expect to use? Round to the nearest hundredth.

2.

An application developer released a new app to be downloaded. The table below gives the number of downloads for the first four weeks after the launch of the app.

Number of Weeks	1	2	3	4
Number of Downloads	120	180	270	405

Write an exponential equation that models these data. Use this model to predict how many downloads the developer would expect in the 26th week if this trend continues. Round your answer to the nearest download. Would it be reasonable to use this model to predict the number of downloads past one year? Explain your reasoning.

3. *** use $x = 1$ for 1980

The accompanying table shows the enrollment of a preschool from 1980 through 2000. Write a linear regression equation to model the data in the table.

Year (x)	Enrollment (y)
1980	14
1985	20
1990	22
1995	28
2000	37

Based on the growth of enrollment, how many students enrolled in 2010?

4.

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 ^{0}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*.

What would the temperature of the cup of soup be after 30 minutes?

Does this make sense in the context of the situation?

5.

A real estate agent plans to compare the price of a cottage, y, in a town on the seashore to the number of blocks, x, the cottage is from the beach. The accompanying table shows a random sample of sales and location data. Write a linear regression equation that relates the price of a cottage to its distance from the beach. Use the equation to predict the price of a cottage, to the *nearest dollar*, located three blocks from the beach.

Number of Blocks from the Beach (x)	Price of a Cottage (y)
5	$132,000
0	$310,000
4	$204,000
2	$238,000
1	$275,000
7	$60,800

6. *** cubic regression

The table shows the number of llamas born on llama ranches worldwide since 1988. Find a cubic function to model the data and use it to estimate the number of births in 1999.

Years since 1988	1	3	5	7	9
Llamas born (in thousands)	0.9	15.1	61.3	158.7	326.5

7.

Bacteria are being grown in a Petri dish in a biology lab. The number of bacteria in the culture after a given number of hours is shown in the table below.

Hour	1	2	3	4	5
Bacteria	1990	2200	2430	2685	2965

Assuming this exponential trend continues, is it reasonable to expect *at least* 3500 bacteria at hour 7? Justify your answer.