

MAT151 – College Algebra/Functions

Written Homework #4 - Exponential and Logarithmic Functions

Name: _____

Directions: Read each question carefully. **Points are awarded based on work shown, completeness and clarity of responses.** Do not round numbers until you have reached the final answer, then use 3 decimal places. Clearly identify the answer in space provided. Include labels and proper notation where appropriate.

Print it, solve it (clear and understandable handwriting), take a picture, and mail it to me as a pdf file or jpg, or just take a pic to a page with only the answers correctly numbered.

1. **(50 points)** From the following table of values:

x	y
0	80
1	40
2	20
3	10
4	5
5	2.5

- Determine **algebraically** if the data set corresponds to an exponential function. Explain why? (Hint: you can add an extra column in the table of values to show your work).
- If it is so, find the annual change factor. Explain if it is a growth or decay factor and why?
- Explain if it is an increasing or decreasing function, and why?
- What is the annual percentage rates of change in decimal and in percentage?
- Write a sentence interpreting the last answer in the real-world context. Make your own context.

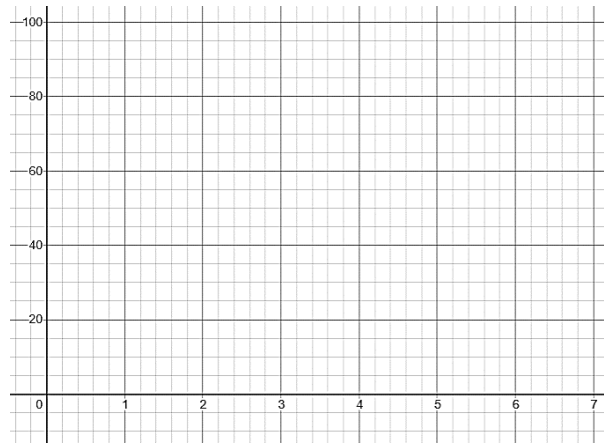
f. Algebraically, find the equation of the exponential function.

g. Use exponential regression find the equation of the exponential function and compare with the answer found in f.

h. Based on the coefficient of determination r^2 , does the model fit the data well? Explain.

i. Graph the exponential function.

j. Evaluate $f(6)$.



2. (20 points)

a. Determine which of the following graphs corresponds with a population model for each of the given countries.

Australia Population Between 1996 and 2006, the population of Australia grew at a rate of 1.2% annually.

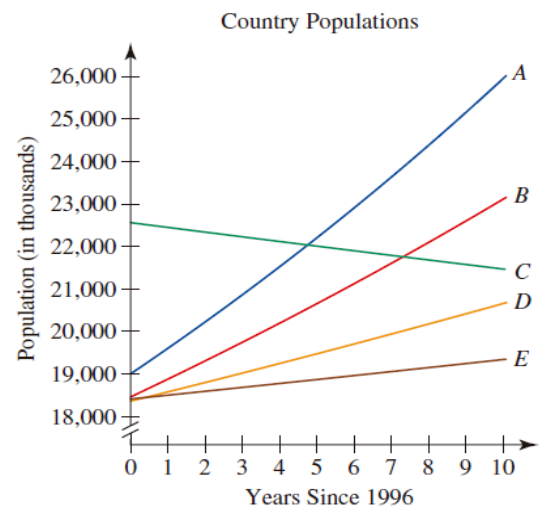
Ghana Population Between 1996 and 2006, the population of Ghana grew at a rate of 2.3% annually.

Romania Population Between 1996 and 2006, the population of Romania *decreased* at a rate of 0.5% annually.

Sri Lanka Population Between 1996 and 2006, the population of Sri Lanka grew at a rate of 0.5% annually.

Afghanistan Between 1996 and 2006, the population of Afghanistan grew at a rate of 3.2% annually.

b. Estimate the population of Australia in year 2005.



3. **(20 points)** Use the inverse relationship between logarithmic and exponential functions to solve each equation for x . Simplify your answers using the rules of logarithms and the change of base formula.

Example: $5^x = 625 \Rightarrow \log 5^x = \log 625 \Rightarrow x \log 5 = \log 625 \Rightarrow x = \frac{\log 625}{\log 5} = 4$

a. $3^x = 13$

b. $e^x = 3$

c. $\log_3(x) = 5$

d. $\log_6(24x) = 3$

4. **(10 points)** Given $125 = 9.04 (1.05)^t$, solve for t .