2.14 Logarithmic Function Context and Data Modeling

AP Precalculus Name: _____ **CA #2**

Instructions: Use the information given to answer the questions. Round to nearest thousandth.

1) Mr. Kelly opens a bank account that pays interest compounded continuously when his son was born. He put $5,000 in right away as well. He knows that he can calculate the value of the account by using the formula, $A(t) = Pe^{rt}$, where *A(t)* is the amount in the account after *t* years, and *P* is the initial amount invested and *r* is the rate earned.

a) Mr. Kelly is hoping that by the time his son is 18 there will be $25,000 in the account. What rate would the account need to be compounded at for that to happen?

b) How much money would be in the account if Mr. Kelly's son didn't touch the money until he was 65 years old for his retirement and earned 8.3% interest?

Instructions: Use the data provided to find a regression equation and answer the questions.

1) Scientists take a sample from a local river and study how many bacteria are in each sample. They've been taking data for several years and want to find a regression equation that models the number of bacteria found (in thousands) as a function of the number of years.

Year	1	3	5	8
Bacteria (in thousands)	14.3	52.4	70.3	86.8

a) What's a logarithmic regression equation that could model this situation?

b) How many years until there are 100 thousand bacteria in a sample on the beach?

c) How many bacteria can be found in a sample after 15 years?

2) Scientists are worried about the cardinal population in Northeast Ohio. Each year the measured the number of tagged cardinals. They hope to find a regression equation that models the number of cardinals as a function of how many years has passed.

Year	3	4	8	9
# of Cardinals	1090	1061	992	980

a) What's a logarithmic regression equation that could model this situation?

b) How many cardinals can we predict there will be in year 20?

c) How many years for there to be 800 cardinals for the year?

ANSWERS

1) A) 16.05%
B) $1,101,510.74

2) A) $f(x) = 14.234 + 34.854 \ln x$
B) x = 11.7, year 12.
C) 108.620 thousand bacteria

3) A) $f(x) = 1199.725 - 99.962 \ln x$
B) 900 cardinals
C) 55 years