Math 1050 A4.6 More Modeling Exponentials	Name

1. A certain culture of bacterium Rhodobacter Spaeroides initially has 25 bacteria and is observed to double every 5 hours.

Equation:

Estimate the number of bacteria after 18 hours.

After how many hours will the bacteria count reach 1 million?

2. The fox population in a certain region has a continuous growth rate of 8% per year. It is estimated that the population in 2005 was 18,000.

Equation:

Use the function to estimate the population in the the year 2013.

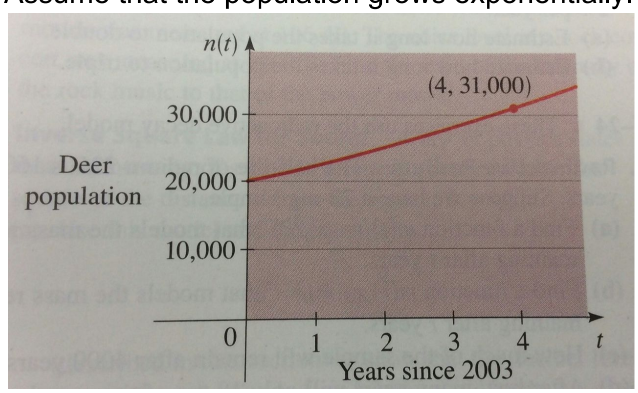
After how many years will the fox population reach 25,000?

3. The population of a country has a relative growth rate of 3% per year. The government is trying to reduce the growth rate to 2%. The population in 1995 was approximately 110 million. Find the projected population for the year 2020 for the following conditions.

The relative growth rate remains at 3% per year.

The relative growth rate is reduced to 2% per year.

4. The graph below shows the deer population in Pennsylvania county between 2003 and 2007. Assume that the population grows exponentially.



What was the deer population in Pennsylvania county between 2003?

Find a function that models the deer population t years after 2003.

What is the projected deer population in 2011?

Estimate how long it takes the population to reach 100,000.

5. A culture starts with 8600 bacteria. After one hour the count is 10,000. Find a function that models the number of bacteria n(t) after t hours. Find the number of bacteria after 2 hours. After how many hours will the number of bacteria double?	6. The half-life of radium-226 is 1600 years. Suppose we have a 22-mg sample. Find the function m(t) that models the mass remaining after t years. How much of the sample will remain after 4000 years? After how many years will only 18mg of the sample remain?
7. Radium-221 has a half-life of 30 s. How long will it take for 95% of a sample to decay?	8. After 3 days a sample of radon-222 has decayed to 58% of its original amount. What is the half-life of radon-222? How long will it take the sample to decay to 20% of its original amount?
9. A wooden artifact from an ancient tomb contains 65% of the carbon-14 that is present in living trees. How long ago was the artifact made? (The half-life of carbon is 5730 years.	10. A learning curve is a graph of a function P(t) that measures the performance of someone learning a skill as a function of the training time t. At frist, the rate of learning is rapid. Then, as performance increases and approaches a maximal value M, the rate of learning decreases. It has been found that the function $P(t) = M - Ce^{-kt}$ where k and C are positive constants. a. Express the learning time t as a function of the performance level P. b. For a pole-vaulter in training, the learning curve is given by $P(t) = 20 - 14e^{-0.024t}$ where P(t) is the height he is able to pole vault after t months. After how many months of training is he able to vault 12 ft?

11. Solve $10^{1-x} = 6^x$

12. Solve $log_3(x+15) - log_3(x-1) = 2$

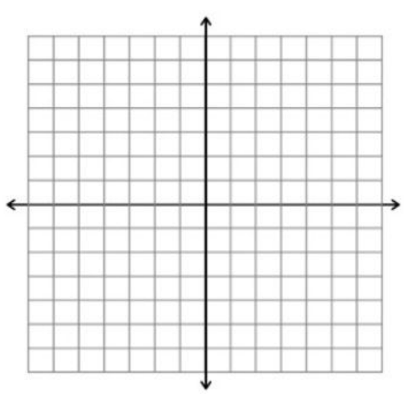
13. Solve for x
$4x^3e^{-3x} - 3x^4e^{-3x} = 0$

14. Use the laws of logs to simplify:
$ln(lne^{e^{200}})$

15. Find the function of the form $y = log_a x$ whose graph goes through the points (3,0.5)

16. Evaluate:
$log_8 0.25$

17. Graph the following and then state the domain and range of g(x).
$f(x) = log_4 x$
$g(x) = 3log_4(x+2)$



18. Find the domain of
$f(x) = log(x^2 - 25)$

19. You find an investment and it doubles once every 7.5 years, how long until your amount triples.

20. Find the average rate of change from x = 2 to x = x + h for $f(x) = 3x^2$