Name: Date: Period:

1. An oil spill is spreading such that its area is given by the exponential function $A(t) = 250(1.15)^t$, where A is the area in square feet and t is the time that has elapsed in days.

   (a) How large was the oil spill initially? ____________________________
   (b) By what percent is the oil spill increasing each hour? ____________________________
   (c) After how many days will the oil spill reach a size of 3,000 square feet? Round your answer to the nearest day. (hint: use your calculator) ____________________________
   (d) What is the average rate of change (slope) of A(t) over the interval $0 \leq t \leq 10$? Show your work, include proper units and do not round.

2. If a flock of ducks is growing by 6% per year and starts with a population of 68, how many ducks will be in the flock after 10 years? Show your work

3. A bank account earns interest at a rate of 3.5% per year and starts with a balance of $350. Which of the following equations would give the account's worth, W, as a function of the number of years, y, it has been gaining interest?

   (a) $W = 350(1.035)^y$ (b) $W = 350(.035)^y$ (c) $W = 1.035y + 350$ (d) $W = 1.35y + 350$

4. The amount, A, in grams of a radioactive material that is decaying can be modeled by $A(d) = 450(0.88)^d$, where d is the number of days since it started its decay.
   (a) By what percent is the material decaying per day? ____________________________
   (b) Give an interpretation of the fact that A(14) = 75. ____________________________
   (c) The material is safe to transport once it has less than 5 grams of radioactive mass left. Using the table in your calculator, determine the first day when it will be safe to transport this material. Show some entries from your table to support your answer.

x	y

   Based on the information in my table, the material will be safe to transport on the ________ day.

5. Newton's Law of Cooling can be used to predict the temperature of a cooling liquid in a room that is at a certain steady temperature. We are going to model the temperature of a cooling cup of coffee. The Fahrenheit temperature of a cup of coffee, T, in a room that is at a 72° F is given as a function of the number of minutes, m, it has been cooling by:

$$T(m) = 114(0.86)^m + 72$$

   (a) Find T(0) and using proper units, explain your answer. ____________________________
   (b) By what percent does the difference between the temperature of the coffee and the temperature of the room decrease each minute? ____________________________
   (c) My ideal temperature for coffee is around 100° F. How long should I wait. Provide some values from your table to support your answer.

m (minutes)	T (m)

   Based on the information in my table, I should wait about _______minutes to drink my coffee.