____ Has Grit Date_________________ Period ___

Mathematics III for College Graduates **Day 32A CW/HW**

Unit 3: Logarithmic & Exponential Functions | Topic: Applications – Growth & Decay

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$A = p(1+r)^t$

$A = p(1-r)^t$

$A = Amount\ at\ any\ given\ time$

$P = \text{Pr}incipal\ \left(amount\ you\ start\ with\right)$

$r = rate\ \left(of\ increase\ or\ decrease\right)$

$t = time\ in\ years$

Example 1

Twenty grams of Carbon 15 is stored in a container. The amount *C* (in grams) of Carbon 15 present after *t* years can be modeled by $C = 20(.98767)^t$.

A. Identify 1.) initial amount

2.) growth factor

3.) annual percent of decrease

B. How much Carbon 15 is present after 1500 years?

C. How long will it take for the Carbon to reach its half life?

D. How long will it take for there to be 5 grams of Carbon 15?

Example 2

Back in the old days…. In the year 1990 math teachers everywhere needed dry erase markers. There was such a demand that markers skyrocketed in value. Mrs. Smith bought a case of black markers for $20.00. The markers' value increased at a rate of 7% per year.

A.) Write an exponential growth model for the value of the markers in terms of the number of years since the purchase.

B.) What was the value of the markers after 2 years?

C.) How much are the markers worth today?

D.) How long did it take for Mrs. Smith to double her original investment?

1. In1990, the tuition at a private college was $15,000. During the next 9 years, tuition increased by about 7.2% each year.
   a. Write a model giving the cost *C* of tuition at the college t years after 1990.
   b. What is the tuition in 2010?
   c. What year was the tuition $20,000? Give the answer to 3 decimal places.

2. Ten grams of Carbon 14 is stored in a container. The amount *C* (in grams) of Carbon 14 present after *t* years can be modeled by $C = 10(.99987)^t$.
   a. Identify the initial amount, the growth factor, and the annual percent decrease.
   b. How much Carbon 14 is present after 1000 years?
   c. When will there be half the amount of carbon? Give the answer to 3 decimal places.

3. From 1991 through 1995, the number of computers per 100 people worldwide can be modeled by $C = 25.2(1.15)^t$ where *t* is the number of years since 1991.
   a. Identify the initial amount, the growth factor, and the annual percent increase.
   b. What is the number of computers per 100 people worldwide in 2000?
   c. When will the number of computers be 3000? Give answer to 3 decimal places.

4. You purchase a stereo system for $830. The value of the stereo system decreases 13% each year.
   a. Write an exponential decay model for the value of the stereo system in terms of the number of years since the purchase.
   b. What is the value of the system after 2 years?
   c. When will the stereo be worth half the original value?

5. The number of newly reported cases of tuberculosis *T* (in thousands) in the United States from 1991 to 1996 can be approximated by the equation $T = 28.5(0.9567)^t$, where *t* represents the number of years since 1990.
   a. Identify the initial amount, the decay factor, and the annual percent decrease.
   b. Find the number of newly reported cases in 2005.
   c. In what year was the number of newly reported cases in the United States 25,000? Give the answer to 3 decimal places.

6. A house was purchased for $90,000 in 1995. If the value of the home increases by 5% per year, what is it worth in the year 2020? How long will it take for the value to reach $200,000(give answer to 3 decimal places)?

7 You have bought a new car for $26,500. The value *y* of the car decreases by 18% each year.
   a. Write an exponential decay model for the value of the car.
   b. Use the model to find the value of the car after three years.
   c. When will the car have a value of $18,000? Give your answer to 3 decimal places.