AFM : Exponential/Logarithmic Modeling Notes Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Formulas for compounding interest.** *(Refer to 6.2 page 389 – 393 for help)*

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| 1. **For “n” compoundings per year:**
 | **Compounding Continuously** |

\*Example:

1. A sum of $10,000 is invested at an annual rate of 8%. Find the balance in the account after 5 years if:
2. Compounded quarterly.
3. Compounded continuously.
4. Which is the better investment? How much MORE do you make with that investment?
5. How long will it take your money to double with these options?
6. **Exponential Growth/Decay Models** *(Refer to 6.6 page 421 – 425 for help)*

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| 1. **Growth**
 | 1. **Decay**
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\*Example:

1. In 1990, the population of Africa was 643 million and by 2006 it had grown to 906 million.
2. Find the exponential growth function that models the data for t years after 1990. (Hint: find the relative growth rate first)
3. By which year will Africa’s population reach 2000 million, or two billion?
4. **Half-life** *(Refer to 6.6 page 424 for help)*

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| Similar to:  |

\*Example:

1. Strontium-90 is a waste product from nuclear reactors. As a consequence of fallout from atmospheric nuclear tests, we all have a measurable amount of strontium-90 in our bones.
2. The half-life of strontium-90 is 28 years, meaning that after 28 years a given amount of substance will have decayed to half the original amount. Find the exponential decay model for strontium 90. (Hint: find decay rate first)
3. Suppose that a nuclear accident occurs and releases 60 grams of strontium-90 into the atmosphere. How long will it take for strontium-90 to decay to a level of 10 grams?
4. Polonium-210 has a half-life of 140 days. Suppose a sample of this substance has a starting mass of 300 mg.
5. Find the function that models the amount of the sample remaining at any time t days.
6. Find the mass remaining after one year.
7. How long will it take for the sample to decay to 200mg?
8. The half-life of a radioactive substance is 153 days. How many days will it take for 70% of the substance to decay?
9. **Logistic Growth Model**

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| *Limiting size (carrying capacity) = \_\_\_\_\_\_\_\_\_\_\_\_* |

\*Example:

1. In a learning theory project, psychologists discovered that  is a model for describing the proportion of correct responses, *f(t)*, after *t* learning trials.
2. Find the proportion of correct responses prior to learning trials taking place.
3. Find the proportion of correct responses after 10 learning trials.
4. What is the limiting size (also called the “carrying capacity”) of the proportion of correct responses, as continued learning trials take place?