PC – Functions Name _____

Exponential Review

Compound Interest: $A = P(1 + \frac{r}{n})^{nt}$

Continuously Compound Interest: $A = Pe^{rt}$

Exponential Growth: $n(t) = n_0 e^{rt}$

1. If $10,000 is invested at an interest rate of 10% per year, compounded semiannually, find the value of the investment after the given number of years.

    a. 5 years

    b. 10 years

    c. 15 years

2. If $4000 is borrowed at a rate of 16% interest per year, compounded quarterly, find the amount due at the end of the given number of years.

    a. 4 years

    b. 6 years

    c. 8 years

3. The rat population in New York City is given by the formula $n(t) = 54e^{0.12t}$ where "t" is measured in years since 1990 and n(t) is measured in millions.

    a. What is the relative rate of growth of the rate population? Express your answer as a percentage.

    b. What was the rat population in 1990?

    c. What is the population expected to be in 2011?

4. A 50-gallon barrel is filled completely with pure water. Salt water with a concentration of $0.3\ {}^{lb}/_{gal}$ is then pumped into the barrel, and the resulting mixture overflows at the same rate. The amount of salt in the barrel at time "t" is given by $Q(t) = 15(1 - e^{-0.04t})$ where "t" is measured in minutes and Q(t) is measure in pounds.

    a. How much salt is in the barrel after 5 min?

    b. How much salt is in the barrel after 10 min?

5. Which of the given interest rates and compounding periods would provide the better investment?
    a. 9.25% per year, compounded semiannually
    b. 9% per year, compounded continuously

6. What principal amount invested for 8 years @ 7.5% APR, compounded weekly will result in a balance of $3,000?

7. I invested $400, 4 years ago in an account that compounded semi-annually. It is now worth $5000. What rate did I have?

8. What APR would double your money in 10 years compounded daily?

9. What APR would triple my money in 9 years compounded weekly?

10. What principal amount invested for 10 years @ 5 ½ % APR, compounded semi-annually will result in a balance of $3,000?

11. Good old grandma deposited $3,450 into Jenny's account the day she was born and the account has had no other deposits or withdrawals since. The account earns 6¾ % annual interest, compounded continuously.
    A. Write an equation to represent the growth of this account after t years.

    B. If Jenny is 15 years old now, how much money is in the account?

    C. If Jenny leaves this money in the account until she is 25 years old, how much money will she have?

12. Alex invested $4,200 for 5 years in a bank that pays 5.2% APR **compounded weekly**.

    A. What was the value of his investment at the end of that period?

    B. What would have been the value of his investment if he had put the money in another bank with the same interest, but compounded continuously?