Name:_____ Date:_____ Period:____

Exponential Applications -Finance (Notes)

There are two important functions that financial institutions use to calculate the balance of their clients' accounts. The first of these is: $A = P_o\left(1+\frac{r}{n}\right)^{nt}$ where **A** is the amount when **Po** dollars is deposited at an interest rate of **r** compounded **n** times per year for **t** years.

Example 1

How much does a person have in their account after 5 years if they deposited $2000 at an interest rate of 2.3% compounded monthly?

Example 2

How much does a person need to deposit in their account so that after 6 years they have $5000 if the account pays an interest rate of 4% compounded daily?

The second common function is the one financial institutions use to compound interest **continuously**. It is: $A = Pe^{rt}$

Example 3

How much does a person have in their account after 5 years if they deposited $2000 at an interest rate of 2.3% compounded continuously?

Example 4

How much will a person need to deposit in their account so that after 6 years they have $5000 if the account pays an interest rate of 4% compounded continuously?

A businesswoman wishes to invest $25,000 at 6% interest at your bank which compounds interest monthly. She wants to know how many years it will take to double her money at this interest rate. The function for the amount in an account after "t" years is:

$A(t) = P\left(1 + \frac{r}{n}\right)^{nt}$ where

A(t) is the amount in the account after t years
P is the principal invested
r is the interest rate expressed as a decimal
n is the number of compounding periods in a year

Find the length of time in years it will take for the account to reach $50,000. (Hint: use logarithms and their properties to solve.) SHOW ALL WORK!

The NCAA holds a championship basketball tournament each spring. The nation's top 64 teams in Division 1 are invited to play. When a team loses, it is out of the tournament. Determine the number of teams left in the tournament after round 5. Write an equation in the form $y=ab^x$ to solve this. (Hint: a is the initial number of teams, and b is the rate at which they are being eliminated.) Be sure to show all work.

A biologist is observing a strain of bacteria growing in a petri dish. The population of the bacteria increases exponentially over time. If the 1st bacteria took 1 hour to divide into 2 bacteria, how long will it take for 30 bacteria in the disk to grow to at least 1000? Make sure your write down your equation and show all work.

Exponential Applications -Finance

Answer the following, showing all your work on a separate piece of paper.

1. Jackie is buying a house. The amount of their loan for the house is $108,000. The loan Jackie will take out charges 5.55% annual interest. If the loan is for 15 years, how much will the monthly payments be?

2. Maria Gonzalez needed to decide into which bank to deposit her $3000 savings. Bank One offered her 4.7% interest compounded daily but she had to keep her money in the bank for at least 4 years. Frost Bank offered 4.8% interest compounded semiannually with the same condition that she had to keep her money in the bank for at least 4 years. Which bank should she go with and why?

3. John Matterson wishes to save $7000 as a down payment for a car that he plans to buy in 6 years. How much money should he deposit into a Money Market account that pays 6.5% interest compounded continuously to earn his down payment?

4. Jason and Lucia are buying a house. The amount of their loan for the house is $98,000. They secured a loan, which charges 6.75% annual interest. If the loan is for 30years, how much will the monthly payments be?

5. Elsa has her eye on a $14,450 car. She plans to take out a loan for the car. The Dealer offers her 8.4% interest rate compounded monthly. How much will she save if she takes out a 4-year loan as opposed to a 5-year loan?

6. Which would be the better deal for Lonnie a loan for $2500 at 2.5% interest compounded annually for four years, or a loan for $2500 at 3.5% interest compounded continuously for three years? Explain your reasoning.

7. Karen has $5000 to invest in two stocks. She decides to invest $3200 in LIQD stock that pays 11.3% interest and $1800 in DISNEY stock that pays 10.5% compounded daily. How much money would she make after investing for two years?

8. Estimate the time it will take for an investment of $2500 to double in value if it is invested at 8% interest.

9. Estimate the time it will take for an investment of $2500 to triple in value if it is invested at 8% interest.