

An Application of Exponential Functions - COMPOUND INTEREST

1. Suppose \$1000 is invested in a savings account at an 8% interest rate. How much is in the account after 10 years if the money is:

a. compounded annually? _____

b. compounded monthly? _____

2. How much should be invested at an interest rate of 5.5% for 20 years to obtain the accumulated amount of \$1,000,000 if the principal was compounded quarterly.

(Note: Write an equation and solve it algebraically.)

3. At what interest rate (to the nearest 0.01%) compounded monthly must \$4000 be invested for 5 years so that the accumulated amount is \$5,500?

(Note: Write an equation and solve it algebraically. Show all work)

4. How long would it take for an investment of \$1000 to double in value if it earns 5% compounded weekly?

(Note: Write an equation to solve this problem, but solve the equation graphically, not algebraically.)

Equation: _____

It would take _____ to double in value?

How long would it take for the investment to triple in value? _____

Would the lengths of time change if the investment of \$1000 was increased to \$5000? Explain.

5. Suppose \$1000 is invested in a savings account at an 8% interest rate. How much is in the account after 10 years if the money is compounded continuously?

6. How much should be invested at an interest rate of 5.5% for 20 years to obtain the accumulated amount of \$1,000,000 if the principal was compounded continuously?
(Note: Write an equation and solve it algebraically.)

7. At what interest rate (to the nearest 0.01%) compounded continuously must \$4000 be invested for 5 years so that the accumulated amount is \$5,500?
(Note: Write an equation to solve this problem, and solve the equation graphically, not algebraically.)

8. How long would it take for an investment of \$1000 to double in value if it earns 5% compounded continuously?
(Note: Write an equation to solve this problem, but solve the equation graphically, not algebraically.)

9. EXPONENTIAL GROWTH AND DECAY

Note: The model for "compound interest compounded continuously" can also be applied to general growth and decay models.

(Example from Textbook) In 1930 the population of the western United States was 12.32 million people and it has grown exponentially with a rate of change of 2.47%.

a. Find a function $A(t)$ which models the growth of the western United States per year after 1930.

$$A(t) = \underline{\hspace{10em}}$$

b. Use your model to approximate the number of people in the western United States in 1980.
(Note: The actual population was 42.41 million people.)