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Math_Questions_0005

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GP Unit 4

Name:

Section Number:

Instructions:

- Identify the document by typing your full name and section number next to the yellow text.
- Rename the file by adding your last names to current file name (e.g., "u4gp_lastnames.doc").
- Type your answers next to the yellow text.
- To show your work, you will need to include
 - the formula with substituted values.
 - the final calculated answer with units.

Please add your file.

- 1) An open-top box is to be constructed from a 6 by 8 foot rectangular cardboard by cutting out equal squares at each corner and the folding up the flaps. Let x denote the length of each side of the square to be cut out.
- a) Find the function V that represents the volume of the box in terms of x .

Answer

- b) Graph this function.

Show Graph here

- c) Using the graph, what is the value of x that will produce the maximum volume?

Answer

- 2) The volume of a cylinder (think about the volume of a can) is given by $V = \pi r^2 h$ where r is the radius of the cylinder and h is the height of the cylinder. Suppose the volume of the can is 100 cubic centimeters.

- a) Write h as a function of r .

Answer

Show work in this space

- b) What is the measurement of the height if the radius of the cylinder is 2 centimeters?

Answer

Show work in this space

- c) Graph this function.

Show graph here

- 3) The formula for calculating the amount of money returned for an initial deposit money into a bank account or CD (Certificate of Deposit) is given by

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

A is the amount of returned.

P is the principal amount initially deposited.

r is the annual interest rate (expressed as a decimal).

n is the compound period.

t is the number of years.

Suppose you deposit \$10,000 for 2 years at a rate of 10%.

- a) Calculate the return (A) if the bank compounds annually ($n = 1$).

Answer:

Show work in this space. Use ^ to indicate the power.

- b) Calculate the return (A) if the bank compounds quarterly ($n = 4$).

Answer:

Show work in this space

- c) Calculate the return (A) if the bank compounds monthly ($n = 12$).

Answer:

Show work in this space

- d) Calculate the return (A) if the bank compounds daily ($n = 365$).

Answer:

Show work in this space

- e) What observation can you make about the increase in your return as your compounding increases more frequently?

Answer:

- f) If a bank compounds continuous, then the formula takes a simpler, that is

$$A = Pe^{rt}$$

where e is a constant and equals approximately 2.7183.

Calculate A with continuous compounding.

Answer:

Show work in this space

- g) Now suppose, instead of knowing t , we know that the bank returned to us \$15,000 with the bank compounding continuously. Using logarithms, find how long we left the money in the bank (find t).

Answer:

Show work in this space

- h) A commonly asked question is, "How long will it take to double my money?" At 10% interest rate and continuous compounding, what is the answer?

Answer:

Show work in this space

- 4) For a fixed rate, a fixed principal amount, and a fixed compounding cycle, the return is an exponential function of time. Using the formula, $A = P\left(1 + \frac{r}{n}\right)^{nt}$, let $r = 10\%$, $P = 1$, and $n = 1$ and give the coordinates (t, A) for the points where $t = 0, 1, 2, 3, 4$.

- a) Show coordinates in this space

Show work in this space

- b) Show graph here

- 5) Logarithms:

- a) Using a calculator, find $\log 10000$ where \log means \log to the base of 10.

Answer:

- b) Most calculators have 2 different logs on them: \log , which is based 10, and \ln , which is based e . In computer science, digital computers are based on the binary numbering system which means that there are only 2 numbers available to the computer, 0 and 1. When a computer scientist needs a logarithm, he/she needs a \log to base 2 which is not on any calculator. To find the \log of a number to any base, we can use a conversion formula as shown here:

$$\log_b a = \frac{\log a}{\log b}$$

Using this formula, find $\log_2 10000$.

Answer:

Show work in this space