**COLLEGE ALGEBRA PROJECT**  Names\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Group Component** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Directions:**

* Work in small groups of 2 to 3 people. Feel free to send a representative to another group if your group gets stuck.
* Each group will hand in only **one** completed project at the end of the class period. This version will be graded. Make sure it is an **extra write-up**, not a group member’s original work.
* You must SHOW ALL WORK (including set-ups) to receive full credit. Pay attention to details.
* **Do not round within an expression, wait until the end of each part.**
* **Round money values to the closest cent.**
* Remember to include units on final answers.

# HARD TIMES, HARD LOANS

When you borrow money by taking out a loan or using credit cards, financial institutions use compound interest to calculate how much money you are required to pay back. Compound interest is assessed on the principal, but then this interest is added to the principal, increasing the overall principal for the next assessment.

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1. Give the formula for accumulated value when there is **compound interest n times a year.** Fill in the variable legend, i.e. explain what each variable stands for in words in a neat format.

FORMULA

A=

P =

r =

t =

n=

Suppose you need to borrow $6000 to pay for your tuition. The bank you take the loan out from charges 7.5% interest per year interest is **compounded monthly**. Suppose it takes you 5 years to pay it back.

1. How much have you paid the bank after the 5 years?
2. How much did you pay in **interest**? *Show your calculations.*
3. Give the formula for **continuously compounded interest**. Include a variable legend, i.e. explain what each variable stands for in a neat format.

A =

P =

r =

t =

FORMULA

Once again, you need to borrow another $6000 to pay for your tuition. The bank now lets you take the loan out at the same 7.5% interest per year, but it is **compounded continuously**. Suppose it takes you 5 years again to pay it back, just as before.

1. How much have you paid the bank in total after the 5 years?
2. How much did you pay in **interest**? *Show your calculations.*
3. Compare your answers to parts (c), and (f). Draw a reasonable conclusion. *Be sure to write in clear, complete sentences.*

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1. Briefly explain why you think credit card companies compound your account continuously and not monthly.

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1. If you invested $800 in an account that is **compounded monthly** at 1.5% annual interest, how many years would it take your money to triple. Give both the EXACT answer and an estimated answer *rounded to the nearest tenth.*

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1. Suppose you won $50,000 in the lottery! If you were to invest the money at 4.25% annual interest **compounded continuously**, how long would it take you to become a millionaire? *Round your answer to the nearest year.*
2. Does this answer surprise you? Why or why not?