Assignment 2
Your Financial Future
Due: Monday, January 18, 2016 at 11:59pm

Grading: EVERY assignment in this course is graded by demoing your work for 10 minutes with a TA. You are required to meet with a TA within one week from the due date to demo. You are penalized for failure to see a TA within the week or missing a scheduled appointment. In either case, if you are within 1 day (24 hours) of the deadline, you lose 10 points. If you are within 7 days (1 week) of the deadline, then you lose 25 points, anything outside of a week from the deadline to demo is an automatic 50 point deduction. Your job is to convince the TA that your program works correctly, i.e. show your TA how to use/break your program☺

There is a lot of software that helps calculate your finances. Let's create a basic program to calculate how long it will take to pay off a loan, how long it will take an investment to mature, and future value.

(50 pts)Implementation
The user must be able to choose which equation they want to calculate at the start of the program. For each equation, the user should give a threshold value for where they want to be by a specific point in time. For example, they may want to have a loan paid off in five years. They would provide this value, along with the other required information for the equation, and the program should tell them the result of the equation as well as if they will meet their threshold.

An example run of this program looks like this:
_____
Welcome to the Financial Calculator!
What would you like to calculate?
1 - Loan Balance
2 - Continuously Compounded Interest
3 - Future Value
Selection: 2

You have chosen to calculate Continuously Compounded Interest.
What is the Principal Investment in Dollars (eg. 500): 1000
What is the annual interest rate (as a decimal): 0.09
How long in years will you be compounding: 5
What is your goal Amount in dollars by the provided time: 5000

Your goal amount was $5000
The actual amount after 5 years is $1568.31
You will not meet your goal.

The equations are as follows:

Loan balance after n payments have been made:

$$B = A(1+i)^n - (P/i)*[(1+i)^n -1]$$

where:

A is the initial investment (taken via user input)

i is the the interest rate per period, not per year (taken via user input) (For instance, if the loan payments are made monthly and the interest rate is 9%, then i = 9%/12 = 0.75% = 0.0075.)

P is the amount of each equal payment (taken as user input)

n is the number of time periods elapsed at any given point (taken as user input)

B is the amount of the loan left based on the calculation (you should provide this to the user)

You should also take a goal amount. For example, the user may want B to be zero after all of the input is put in. You should do a comparison of the goal B and the actual B and tell the user if they met their goal.

http://brownmath.com/bsci/loan.htm#Formulas

Continuously Compounded Interest

$$A = Pe^{rt}$$

where:

P is the principal investment (taken as user input)

r is annual interest rate as a decimal (taken as user input)

t is the amount of time in years (taken as user input)

e is the mathematical constant

A is the amount of money that you will have, this should be provided to the user

You should also take a goal A (amount) that the user would like to reach after all of the inputs have been taken in. For example, the user may hope to have $10000 after their provided time period. You should do a comparison of the goal A and the actual A and tell the user if they met their goal.

http://cs.selu.edu/~rbyrd/math/continuous/

Future Value

$$FV = C_0 * (1+r)^n$$

where:

C_0 is starting cash flow (taken as user input)

r is the rate of return (taken as user input)

n is the number of periods (taken as user input)

FV is the future value in dollars of the business or item in question which you will provide to the user

You should also take a goal FV (future value) that the user would like to reach after all of the inputs have been taken in. For example, the user may hope the value of their car is $5000. You should do a comparison of the goal FV and the actual FV and tell the user if they met their goal.

http://www.financeformulas.net/Future_Value.html

(40 pts) Design and Testing
You must design this program in a separate pdf and include a test plan for all design paths (hint: you should have three). Your test cases must be based on real world scenarios (not just random numbers).

You will be graded on how thorough your test plan is. Make sure you think about input you hope works and input that won't work. Your program doesn't have to handle input that doesn't work!!! Your test cases will be used to demo your program along with one master path which will be provided by the TA. Test your program thoroughly! **Please see the example of a design and test plan: Polya_template.pdf**

(10 pts) Program Style/Comments
In your implementation, make sure that you include a program header in your program, in addition to proper indentation/spacing and other comments! Below is an example header to include. Make sure you review the style guidelines for this class, and begin trying to follow them, i.e. don't align everything on the left or put everything on one line!
http://classes.engr.oregonstate.edu/eecs/winter2016/cs161-001/161_style_guideline.pdf

```
/*****************************************************
** Program: finance.cpp
** Author: Your Name
** Date: 1/18/2016
** Description:
** Input:
** Output:
*****************************************************/
```

Electronically submit your C++ program (.cpp file, not your executable!!!) and test plan, as a pdf, by the assignment due date, using TEACH.

**NOTE: The easiest way to upload your program from ENGR to TEACH is to map a network drive to your home directory on ENGR. Mac or Windows, See:
http://engineering.oregonstate.edu/computing/fileaccess/