

CS 150 – 01

Programming Assignment #3

Loops, Loops, Loops, Loops, ...

Date Assigned: Monday, September 27, 2010

Design Documents: Thursday, September 30, 2010 5 pm (5 points)

Date Due: Wednesday, October 6, 2010 9:15am (35 points)

Total Points: 40 pts

You are just about ready to buy a new computer and you want to investigate how to pay for it. You have a few credit cards and need to determine how much buying the computer using each credit card will cost if you only make the minimum monthly payment each month.

Since you are still not sure which computer you want, or which of your many credit cards you want to use, the program needs to ask you for the total cost of the computer, the monthly interest rate on your credit card, and your minimum monthly payment. Each piece of input needs to be validated. Continue asking the user for the incorrectly input data until valid data is given. The cost of the computer must be positive, the interest rate must be between 0 and 1 (and cannot be 0 or 1), and the minimum monthly payment must allow you to pay off your credit card. If the user enters an invalid minimum monthly payment show the user what the minimum monthly payment must be.

The program must display a table, shown below, that contains, for each month, the starting balance, the interest gained, and the ending balance. You must display the table until the new balance is zero. When the balance of the account is less than the minimum payment, you will pay the remaining balance on the account rather than the minimum payment. After the table you need to display the total amount paid for the computer and the total interest paid.

Be sure to format the table exactly as shown below. All dollar amounts must be shown to two decimal places.

Sample input and output

```
*****  
*   Computer Price Explorer   *  
*****
```

What is the cost of the computer? **100.00**

What is the monthly interest rate? **0.01**

What is the minimum payment? **10.00**

Month	Balance	Interest	New Balance
1	100.00	1.00	91.00
2	91.00	0.91	81.91
3	81.91	0.82	72.73
4	72.73	0.73	63.46
5	63.46	0.63	54.09
6	54.09	0.54	44.63
7	44.63	0.45	35.08
8	35.08	0.35	25.43
9	25.43	0.25	15.68
10	15.68	0.16	5.84
11	5.84	0.06	0.00

Total Paid: \$105.90

Total Interest Paid: \$5.90

Sample Input and Output – Data Validation

```
*****
*   Computer Price Explorer   *
*****

What is the cost of the computer? -19
Your computer must have a positive cost!
What is the cost of the computer : 1000.00

What is the monthly interest rate? -0.12
The interest rate must be between 0 and 1
What is the monthly interest rate? 11
The interest rate must be between 0 and 1
What is the monthly interest rate? 0.042

What is the minimum payment? 1
That minimum payment will not allow you to pay off your credit card!
The minimum payment must be larger than: $42.00
What is the minimum payment? 39.00
That minimum payment will not allow you to pay off your credit card!
The minimum payment must be larger than: $42.00
What is the minimum payment? 42.01

. . . .
<The rest of the output>
```

Submit an electronic copy of your design document

Before you start you need to think about the data in your program and the calculations and loops you will need to perform. Answer the following questions in a **new** GoogleDoc (named **CS150_03ProgramDesignPUNetID**) and share the document with the instructor (profchadd@gmail.com). Be sure to answer the questions in complete sentences where appropriate. This design document is due on **Thursday at 5pm**.

Design Questions:

1. List each variable declaration necessary to store the data and information in your program. Be sure to name your variables clearly so readers of your code will have no problem understanding their purpose. Pay very close attention to the data types for each variable.
2. Briefly describe the calculations you will need to perform in your program. Be sure to explain which variables from 1. will be used in each calculation.
3. For each loop used in your program, discuss what will happen in the loop and what data and conditions will be used by the program to stop the loop.

To complete this assignment you must

1. Create a new C++ project in Visual Studio. Name your project **03Loopsxxxxxxxx**, where xxxxxxxx must be replaced by your PUNetID. As an example, my project would be called "03Loopskhoj0332". It is vital that you name your project correctly!
2. Type the solution (**fully documented/commented**) to the problem into your project.
3. Remember to enter in your name as the author of the program.
4. Make sure that your program compiles and runs correctly. If you get any errors, double check that you typed everything correctly. Be aware that C++ is case-sensitive.
5. Once you are sure that the program works correctly it is time to submit your program. You do this by logging on to Turing and placing your complete project folder in the **CS150-01 Drop** folder. Make sure that you copy your program folder and don't move the folder. If you move the folder, then you will not have your own copy!

Notes:

1. You must format the output to look **exactly** like the sample output by using the input/output manipulators.
2. You must use loop statements.
3. You must follow the coding standards.
4. This is a much larger and more complicated program than assignment 1 or 2. Start early!

► **HINT:** Break this project into pieces! Code the output header then test; code the input validation then test....

Submitting this project:

To receive full credit for this assignment, your project must be in the drop box by 9:15am on the day that it is due. Anything received after that will be considered late. Further, you must bring a **hard copy** of your program to class and place the hard copy on the instructor's desk by 9:15am. You must staple the pages if necessary. Submit the **design document by Thursday at 5pm**.

Start Early! Do not wait until the last minute to print your program! **Good Luck!** ☺

Remember, this is an individual assignment. Refer to the syllabus for assignment policies