Project 2 – Counting Letters and Numbers

Overview: Your project is to create a program to calculate some statistics for data entry. Users will enter in data one number or character at a time. Based upon this input the program will sum up the total number of characters input, type of character, and minimum/maximum numbers.

Goal: The goal of the project is to use indefinite repetition and other flow control statements such as if and switch statements.

Description: This program will calculate various statistics for characters entered at the keyboard by the user. You need to track the total number of characters or numbers entered. And then calculate statistics as described below. The user will have the choice of whether they want to experiment with random numbers or count characters. Based upon this choice, the program will then prompt the user for either the count of random numbers or entering the characters.

First, ask the user if they want to generate random numbers or calculate character statistic. If the user chooses numbers, then do the following:

### Random Number Creation

* Prompt the user for a number between 10 and 1000. This will be the upper bound of the random numbers to be generated. Make sure to validate that the user entered in this range. And handle the case of non-numeric input (see slides COMP 51-05 for details).
* Prompt the user for the number of times to run the loop. This will be the number of time that you will generate random numbers. It should be > 3.
* Each time a new number is generated, compare this new number against a current minimum number. If the new number is smaller, than save this “smallest” number.
* Also compare this new number against a current maximum number. If the new number is larger, than save this “largest” number.
* Finally, add this number to the total.
* Display the following table inside the loop:
* Example Table (ignore the borders for now):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | counter | loops | current | lowest | highest | total |
| Initial values | 0 | 10 | 0 | 0 | 0 | 0 |
| End of loop 1 | 1 | 10 | 1 | 1 | 1 | 1 |
| End of loop 2 | 2 | 10 | 2 | 1 | 2 | 3 |
| End of loop 3 | 3 | 10 | 5 | 1 | 5 | 8 |
| End of loop 4 | 4 | 10 | 4 | 1 | 5 | 12 |
| End of loop 5 | 5 | 10 | 2 | 1 | 5 | 14 |
| End of loop 6 | 6 | 10 | 6 | 1 | 6 | 20 |

* After display the above table, display the final lowest, highest, and average values for the numbers that were generated.

### Character Input

If the user chooses to calculate statistics for character input, do the following. Ask the user for one character (terminated by a carriage return).Using flow control, classify the character into one of these categories:

1) vowel

2) consonant

3) digit (0-9)

4) other

Output the character input, its numeric decimal value, and the classification. Total up the number of each type of character entered. After the character is entered, ask the user if they want to continue (Y/N). When they enter N, you can stop prompting for more characters. Make sure to validate for Y or N data entry. Then display the total number of each type of characters entered.

**Extra Credit (2 points) :** Identify the character input as punctuation or “whitespace” characters. Note that you will not be able to “see” all characters using CIN. Hint: whitespace characters are defined as: “space”, \t, \n, \x0B(decimal 11), \f, \r. You will need to research how to enter this kind of a keystroke from the keyboard.

**Extra Credit (3 points) :** Format the numeric table option above to display columns in the same width. Hint – you can set various width and justification options on the cout statement. Also apply borders to the table. You can use the | and \_ symbols to create the borders.

Helpful Code and Hints: The computer needs to generate random numbers in this project. In order to be able to generate random numbers, you must #include the ctime library at the top of your program. The code for creating random numbers should look like this:

// Place this ONCE at the beginning of your program

srand((unsigned)time(0)); // Initialize random number generator (ONCE)

int compNum;

// Use this line as often as needed to get a new random number between 1 and 5

// compNum is a variable name and you can use a different one if you prefer.

compNum = rand()%5 + 1;

Getting Started: If you sit down and try to implement the entire project in one-shot, it will seem over-whelming. It is important to break down the implementation into small manageable pieces and get each piece working correctly before starting on the next one. As you get more comfortable with programming, you’ll naturally start to see how to break apart the projects into small pieces. Below, I’ve suggested a possible sequence of steps you could take to implement your project. Write the code to:

1. Code the initial logic to prompt the user for whether they want to process random numbers or characters.
2. Code the random number section. Initially, just generate some random number to make sure that part is working.
3. Code the character input. Add logic to determine which category a character belongs to.
4. If you have time, work on extra credit.

You should run and thoroughly test your code after each step. It is MUCH easier to find 1 error in 5 new lines of code than it is to find 10 errors in 50 lines of code.

Project Requirements:Your code should be thoroughly commented, and you must include your name in a comment at the top of the file. You should also follow all of the good programming practices we have discussed in class so far, such as meaningful variable names, indentation, and input validation.  
  
Submission:Using the Canvas assignment feature, you should submit the source code (.cpp file). **Make sure you submit your assignment after uploading the file attachment!**

### Other Considerations

You **must** follow all of the good programming practices discussed in class:

* Comment your code thoroughly.
* No use of global variables.
* Indent your code appropriately.
* Use meaningful variable names.
* Provide the user with understandable prompts and instructions.
* Make sure your name is included in comments at the top of your code.
* You are NOT allowed to use goto statements in this or any other COMP 51 projects.
* …

If this is not done, points will be deducted from your program and it will be impossible to earn an ‘A’.