

EE 5103 | Assignment 1 | Due: Feb 10, 11:59 PM

Submit to Blackboard by the deadline.

Watch the videos posted for this (and the previous) week.

Q1 (1 point)

Google and learn about different basic data types natively supported in C++. Write a program to display the sizes of each of those data types.

Q2 (1 point)

Write a program in which you declare an **array of chars** and store the piece of text “All the world’s a stage”. Exclude the quotation marks. Do not use the string type. Do not over-allocate the amount of memory that you need. Now display that piece of text. Then declare an array of 100 doubles. Display the addresses of the 16th, 45th and 90th doubles in that array.

Q3 (3 points)

Write a C++ program for the following. **Do not try to generalize this problem into an equation. The goal is to practice iterations/loops.**

There is an old story that an emperor wanted to thank the inventor of the game of chess and asked the inventor to name his reward. The inventor asked for one grain of rice for the first square, 2 for the second, 4 for the third, and so on, doubling for each of the 64 squares. That may sound modest, but there wasn’t that much rice in the empire!

Write a program to calculate the number of squares that are required to give the inventor a stated number of grains of rice that is provided as the input. For example, the program should calculate the number of squares that are required to earn at least 1000 grains of rice, at least 1,000,000 grains, at least 1,000,000,000 grains, etc. You’ll need a loop, of course, and probably an int to keep track of which square you are at, a double to keep the number of grains on the current square, and a double to keep track of grains of all previous squares. We suggest that you print the value of all your variables for each iteration of the loop so that you can see what’s going on. Demonstrate that the program works using sample inputs from the user.

Q4 (3 points)

Write a program to perform the following tasks. Define an array of characters of size 15. Read 15 characters from the user into the array. Next, read a search character from the user. The program should search for this character in the array. If found, report so, and also report the number times the search character occurs in the input array. Finally, the program should report what other character(s) in the input array occur(s) the same number of times as the search character. Suppose that your 15 character input is “aaaabbbbccccdef”, and the search character is ‘a’. Your program would state that ‘a’ is present in the input and that it occurs 4 times. It would also output stating that “The characters ‘b’ and ‘c’ occur the same number of times as that of ‘a’”.

Q5 (2 points)

Write a program to find a peak in an array of ints. Suppose the array is {-1, 0, 2, 5, 6, 8, 7}. The output should be "A peak is at array index 5 and the value is 8." This is because the value 8 is larger than its predecessor 6 and its successor 7 in the given array. Note that 8 occurs at index 5. (The array starts at index 0.) A number at index i in an array X is considered a peak if: $X[i] \geq X[i-1]$ and $X[i] \geq X[i+1]$. If i is at the beginning of the array, then peak is if $X[i] \geq X[i+1]$. If i is at end of array, then peak is if $X[i] \geq X[i-1]$.

Submission Instructions:

Create a folder called <LastnameFirstname> (E.g. SawyerTom). Name the file for problem 1 as 01.cpp, that of problem 2 as 02.cpp, etc. Place them in the folder <LastnameFirstname>. Compress (zip) the folder to get a file called <LastnameFirstname>.zip. Upload this file to **blackboard** by the due date.
