

CMPSC 201 – Fall 2024
Programming Project 2
To be done individually
Worth 45 points
Due by 11:00 pm on 10/16/24
Confirm all submissions to Canvas

Goals: Developing problem-solving skills, declaring variables, using loops (including nested), using branches, and data validation. This project is designed for practice of all 3 types of loops. Make sure that you follow the instructions carefully.

Problem: Create a program that will assist a scientist in tracking the resistances of products from various batches. The resistances of good resistors should be between 3 and 3.5 inclusive. Your program will need to track the number of resistances that are too high (>3.5 ohms), the number of resistances that are too low (<3.0 ohms) and calculate the average of the resistances that fall in the proper range (≥ 3 and ≤ 3.5).

Your program should prompt the user to enter name of the batch (the batch name may contain spaces) and the number of resistors in that batch. Then use a **while** loop to check that the entered number of resistors is at least one and prompt the user to re-enter the number of resistors in the batch when it is not. (**This while loop should not contain any selection structures.**)

Next use a **for** loop to enter the resistance for each resistor in the batch. The **for** loop should determine the number of resistors that had a resistance that was too low (< 3), the number of resistors that had a resistance that was too high (>3.5) and the average resistance from those resistors that passed (the resistance of ≥ 3 and ≤ 3.5). Inside this for loop should be another **while** loop to prompt the user to re-enter an invalid resistance of 0 or less. (**Again, this while loop should not contain any selection structures.**) Resistances of 0 or less should not be counted as being entered. Only valid values (>0) should be included with the count of entered resistances.

After the for loop output the batch name, the number of resistors that were in the batch, the numbers of resistances that were too low, the number of resistances that were too high and the average resistance of the resistors that passed. Use a **do-while** loop to evaluate another batch if the user indicates the he/she/they has another batch by entering a y (if there is another batch) or n (if there is not another batch). Between iterations of the do-while loop the number of resistors in the batch, the number of resistors that were too high, the number of resistors that were too low, and the average should be set to 0. Sample output is given below.

Your code should not use any concepts beyond Chapter 5 of your textbook (e.g. arrays or programmer-built functions) or use any Boolean variables. Your code should employ a single string object to store the batch name. Use descriptive identifiers (no single characters) for variable names. Remember to write appropriate conditions that indicate when the loop should execute for all your loops. The while loops to check input should not contain any selection

structures. Design your code minimize the number of relational expressions used. Do not use break, continue, return, exit function etc. to stop any loop.

What is the name of the batch of resistors? Barnham Batch 899

How many resistors are in Barnham Batch 899? 9

Now enter the measured resistances for batch Barnham Batch 899.

Enter the resistance in ohms. 3.1

Enter the resistance in ohms. 2.999

Enter the resistance in ohms. 3.3

Enter the resistance in ohms. 3.50001

Enter the resistance in ohms. 3.5

Enter the resistance in ohms. 2.76

Enter the resistance in ohms. 3.2

Enter the resistance in ohms. 3.4

Enter the resistance in ohms. 3.0

There were 9 resistors in this batch. Of these 2 were below 3.00 ohms and 1 were above 3.50 ohms.

The average of the 6 good resistors is 3.25.

Do you have another batch to be analyzed (y/n)? y

What is the name of the batch of resistors? Resist Not Now

How many resistors are in Resist Not Now? -1

There must be at least 1 resistor in the batch.

How many resistors are in Resist Not Now? 0

There must be at least 1 resistor in the batch.

How many resistors are in Resist Not Now? 12

Now enter the measured resistances for batch Resist Not Now.

Enter the resistance in ohms. 3.101

Enter the resistance in ohms. 2.99999

Enter the resistance in ohms. 0

The resistance cannot be zero or less.

Enter the resistance in ohms. 3.0

Enter the resistance in ohms. 3.04

Enter the resistance in ohms. 3.05

Enter the resistance in ohms. 3.56

Enter the resistance in ohms. -1

The resistance cannot be zero or less.

Enter the resistance in ohms. -11

The resistance cannot be zero or less.

Enter the resistance in ohms. 3.17

Enter the resistance in ohms. 3.28

Enter the resistance in ohms. 3.39

Enter the resistance in ohms. 3.20

Enter the resistance in ohms. 3.41

Enter the resistance in ohms. 3.52

There were 12 resistors in this batch. Of these 1 were below 3.00 ohms and 2 were above 3.50 ohms.

The average of the 9 good resistors is 3.18233.

Do you have another batch to be analyzed (y/n)? n

Remember to write introductory comments which includes your name and section number, the purpose of the program with enough detail so someone reading your comments would not need to look for any information elsewhere (e.g. the acceptable ranges), input, output, and processing specified. **Follow the Assignment Guidelines. Attach your source code file to submission on Canvas.**