CS100 Computational Problem Solving
Fall 2019-20

Section 1

Tuesday, 15 October 2019

Lab 07: Exercise

Lab Guidelines

1. Make sure you get your work graded before the lab time ends.
2. You put all your work into the folder **Lab7_YourRollNo_TAname** and submit it on LMS (Assignment>Lab7) before the time the lab ends.
3. Talking to each other is NOT permitted. If you have a question, ask the lab assistants.
4. The object is not simply to get the job done, but to get it done in the way that is asked for in the lab.
5. Phone is NOT allowed. Put it in bag or at instructor desk.
6. Any cheating case will be reported to Disciplinary Committee without any delay.

Coding Conventions:

1. Constants are ALL_CAPS.
2. Variables are all_small.
3. All curly brackets defining a block must be vertically aligned.

Learning Objective:

1. PO-02 Develop proficiency in the practice of computing.
2. CO-02 To help students analyze and solve programming problems
3. LO-02 Critical Thinking and Analysis
4. LO-03 Problem Solving
5. LO-05 Responsibility

Marks: Name: _____ Roll #: _____

Task1									Total
									20

Task2									Total
									25

Task 3									Total
									20

Task 4									Total
									30

Total Marks Obtained

/100

TA: _____

Let's Begin

Task 1: [20 marks]

Write a program for a grocery store, which computes the bill after each sale. User is required to enter name of the product, no. of items sold and price for individual item. The program should ask the user if he/she wants to enter another product or not. The user responds in “yes” or “no” and if he/she enters “no”, print the total bill amount.

Note: getline() should be used to take the name of the products and all the inputs must be validated.

Task 2: [25 marks]

Write a C++ program that calculates highest common factor (HCF) of two numbers. The program should take two numbers as an input from the user and use a while loop to calculate the HCF. For example HCF of 32 and 40 is 8.

Note: The program should also validate the input.

The **highest common factor (HCF)** of two or more numbers is the largest number that is a factor of all of the given numbers.

For example, $8 = \mathbf{1} \times 8 = \mathbf{2} \times \mathbf{4}$

$12 = \mathbf{1} \times 12 = \mathbf{2} \times 6 = 3 \times \mathbf{4}$

$\therefore$ Factors of 8 are 1, 2, 4 and 8.

Factors of 12 are 1, 2, 3, 4, 6 and 12.

So, the common factors of 8 and 12 are 1, 2 and 4.

$\therefore$ HCF = 4

Task 3: [25 marks]

Write a C++ program which takes a number as an input from the user and tells if the given number is a Prime number or not.

```
Enter any number to check prime: 7
7 is a prime number
```

A **prime number** is a whole number greater than 1 that cannot be formed by multiplying two smaller natural numbers.

Task 4: [30 marks]

Using a single while loop, write a C++ program using that allows a user to make transactions via an ATM. Keep the following points in consideration:

1. Initialize an ATM account with an amount of **Rs. 15000**.
2. The program should display a menu that will ask the user whether he/she want to check his/her bank balance, perform cash withdrawals or quit the program.
3. The program should keep on displaying the menu after each transaction until the user chooses to quit.
4. Assume that the user is performing a transaction at an ATM of another bank, where he/she does not have an account. So, the **bank charges of RS. 18.75** should be deducted along with the withdrawal amount from his/her bank balance on **each** cash withdrawal in the loop.
5. User can only withdraw cash in **multiples of 500**.
6. The program should warn and stop the user if he/she is trying to withdraw an amount **which together with the associated bank charges** is more than his/her bank balance amount.
7. Upon quitting, the program should display the **remaining balance** followed by the **new balance after an interest** of **3%** has been added to the amount left. Also display **total amount withdrawn**, **total bank charges** and **interest earned**.
8. Keep the displayed amount correct to 2 decimal places.
9. Perform the appropriate validation checks in your program to ensure that user is entering correct inputs. You are not required to resolve errors associated with cin.fail().

Note: There is no fixed format for output, however your program output should be clearly visible and user interaction should be most understandable.

```
1) Enter 'check' if you want to check your bank balance.
2) Enter 'withdraw' if you want to make a cash withdrawal.
3) Enter 'quit' if you want to end transactions and quit the program.

withdraw

Enter the amount you want to withdraw: 3000

Withdrawal of Rs. 3000 Successful.

1) Enter 'check' if you want to check your bank balance.
2) Enter 'withdraw' if you want to make a cash withdrawal.
3) Enter 'quit' if you want to end transactions and quit the program.

quit

Previous Balance:                    Rs. 15000.00
Total Cash Withdrawn:                Rs. 3000.00
Total Bank Charges:                  Rs. 18.75
Remaining Balance:                   Rs. 11981.25
Interest Earned:                     Rs. 359.44
New Balance after interest:          Rs. 12340.69
```