CS100 Computational Problem Solving
Fall 2019-20

Section 1

Tuesday, 03 December 2019

Lab 14: Exercise

Lab Guidelines

1. Make sure you get your work graded before the lab time ends.
2. You put all your work into th folder **Lab14_YourRollNo_TAname** and submit it on LMS (Assignment>Lab14) 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
									25

Task 4									Total
									30

Total Marks Obtained

/100

TA: _____

Let's Begin

Task 1: **[20 marks]**

Write a program to get a 2D array of temperatures of five cities for a week. Pass this information to a function which stores the highest value in each column of a 2D array to know the highest temperature of each city in a separate array.

Task 2: **[25 marks]**

Using C++ write a program which prints a bar graph as show below:

```
Enter number of bars in the graph: 5
Enter height of the bar 1 (max 10) : 5
Enter height of the bar 2 (max 10) : 3
Enter height of the bar 3 (max 10) : 8
Enter height of the bar 4 (max 10) : 2
Enter height of the bar 5 (max 10) : 6


  X
  X
  X X
X X X
X X X
XXX X
XXXX
XXXX
```

- The program should ask the number of bars and height of each bar from the user
- Height of a bar should not be greater than 10
- Graph must be stored in a 2D array

Task 3: **[25 marks]**

Create a function which takes a **user-defined** array of any size and filter out all the even elements of that array. It stores these elements in a separate array called even[ ] and then displays it . Take the capacity of even[ ] same as the original array, and the array size as the number of even elements.

For example, pass the following array to the function:

Array_1 = {2, 5, 9, 84, 101, 8, 3, 550, 23, 987}

The following array of size 4 will be received in the main:

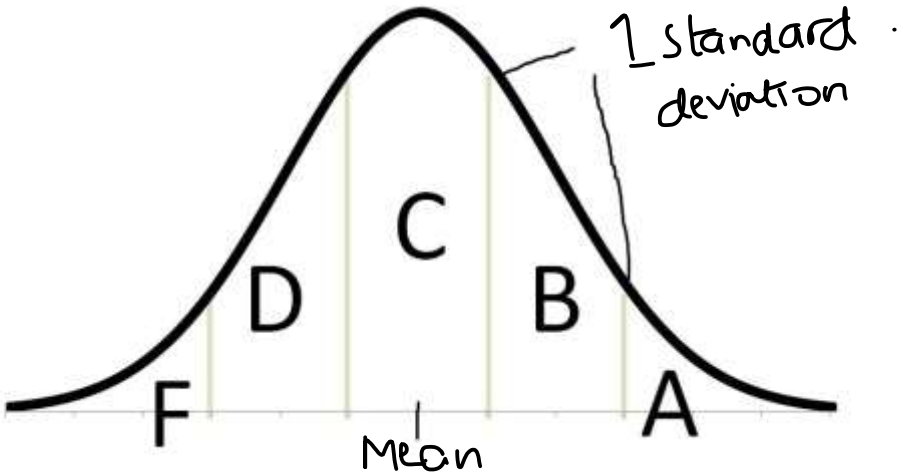
even = {2, 84, 8, 550}

Task 4: **[30 marks]**

Using the concepts of C++, write a program that stores marks of a student corresponding to student ID for a course over a semester in a 2-Dimentional array. The program should take user input for the number of students and then ask to input the marks of students in each component (i.e. quizzes, labs, mid-terms and final-term examinations). The program should then compute the total final percentage for each student, considering the weightage of each component.
Component Weightage:

- Quiz: 20%
- Labs: 30%
- Mid-Term: 20%
- Final-Term: 30%

Using the final percentage that each student obtained in the course, compute mean and standard deviation and grade students according to the relatively (i.e. using a bell curve).
The instructor awards "C" grade at one standard deviation around mean and "F" on 2.5 standard deviation below and "D" on 1.5 Standard deviation below the mean, and "B" on 1.5 Standard deviation and "A" on 2.5 standard deviation above the mean.



Formulas:

Mean =

$$\bar{x} = \frac{\sum x}{N}$$

$\sum x =$ the sum of x

$N =$ number of data

Standard Deviation =

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

σ = standard deviation

$\sum$ = sum of

x = each value in the data set

$\bar{x}$ = mean of all values in the data set

n = number of value in the data set

Example:

Input:

Student ID	Quiz 1	Quiz 2	Lab 1	Lab 2	Mid-Term	Final-Term
2256	15/20	16/20	10/10	08/10	75/100	62/100
2257	08/20	10/20	04/10	05/10	55/100	75/100
2258	11/20	14/20	10/10	04/10	65/100	25/100
2259	18/20	09/20	10/10	06/10	84/100	87/100
2260	12/20	15/20	10/10	09/10	24/100	55/100

Output:

Mean: 65.96%

Standard Deviation: 10.59%

Student ID	Final-Percentage (%)	Grade
2256	76.1	B
2257	56.0	D
2258	54.0	D
2259	80.4	B
2260	63.3	C
