COMSATS University Islamabad
Department of Computer Science
Programming Fundamentals (CSC103)
Class Assignment – 3 (CLO-2)

Instructions

Answer to all questions must be submitted in MS Word Format.

Assignment document must contain a title page showing Assignment-3, your name and registration number.

Assignment document must also contain JAVA source code along with output screenshots.

You must follow proper JAVA naming convention for identifiers and properly document your source code

Plagiarism: Plagiarism is not allowed. If found plagiarized, zero marks will be awarded in the assignment.

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Question – 1:

Write a program that reads in ten numbers and displays the number of distinct numbers and the distinct numbers separated by exactly one space (i.e., if a number appears multiple times, it is displayed only once). (Hint:Read a number and store it to an array if it is new. If the number is already in the array, ignore it.) After the input, the array contains the distinct numbers. Here is the sample run of the program:

```
Enter ten numbers: 1 2 3 2 1 6 3 4 5 2
The number of distinct number is 6
The distinct numbers are: 1 2 3 6 4 5
```

Question – 2:

Write a method that returns a new array by eliminating the duplicate values in the array using the following method header:

public static int[] eliminateDuplicates(int[] list)

Write a test program that reads in ten integers, invokes the method, and displays the result. Here is the sample run of the program:

```
Enter ten numbers: 1 2 3 2 1 6 3 4 5 2
The distinct numbers are: 1 2 3 6 4 5
```

Question – 3:

Write the following method that returns true if the list is already sorted in increasing order.

public static boolean isSorted(int[] list)

Write a test program that prompts the user to enter a list and displays whether the list is sorted or not. If the list is not in sorted order then sort the list and display.

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Question – 4:

Write the following method that tests whether the array has four consecutive numbers with the same value.

public static boolean isConsecutiveFour(int[] values)

Write a test program that prompts the user to enter a series of integers and displays if the series contains four consecutive numbers with the same value. Your program should first prompt the user to enter the input size—i.e., the number of values in the series. Here are sample runs

```
Enter the number of values: 8 Enter
Enter the values: 3 4 5 5 5 5 4 5 Enter
The list has consecutive fours
```

```
Enter the number of values: 9 Enter
Enter the values: 3 4 5 5 6 5 5 4 5 Enter
The list has no consecutive fours
```

Question – 5:

Write the following method that merges two sorted lists into a new sorted list. Implement the method in a way that takes at most list1.length + list2. length comparisons. Write a test program that prompts the user to enter two sorted lists and displays the merged list. Here is a sample run. Note that the first number in the input indicates the number of the elements in the list. This number is not part of the list.

```
Enter list1: 5 1 5 16 61 111 Enter
Enter list2: 4 2 4 5 6 Enter
The merged list is 1 2 4 5 5 6 16 61 111
```

Question – 6:

Write a JAVA Program to Multiply Two Matrix Using Multi-Dimensional Arrays. This program takes two matrices of order r1*c1 and r2*c2 respectively. Then, the program multiplies these two matrices (if possible) and displays it on the screen.

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Question – 7:

Write a program that prompts the user to enter the length of a square matrix, randomly fills in 0s and 1s into the matrix, prints the matrix, and finds the rows, columns, and diagonals with all 0s or 1s. Here is a sample run of the program:

```
Enter the size for the matrix: 4
0111
0000
0100
1111
All 0s on row 1
All 1s on row 3
No same numbers on a column
No same numbers on the major diagonal
No same numbers on the sub-diagonal
```

Question – 8:

Write a Java program that records the roll number (int) and marks of five subjects for each student. Enter the roll number and marks of the first student in the first row, the second student in the second row, and so on. The program should collect data for a total of 10 students in this way. You are required to:

a. Determine the roll number of the student who has the highest total marks.
b. Assuming the PF marks are stored in column 1, find the roll number of the student who has the highest marks in PF.
c. Identify the highest marks obtained by each student (i.e., the maximum value in each row).

Question – 9:

Write a Menu Driven JAVA program that creates one-dimensional array **arr[]** and initialize it with user. The program should do following Tasks using Menu, the menu operations are implemented using methods:

1. Write a method ***count()***, that counts the occurrences of x (a number) in arr[].
2. Write a method ***partition(),*** that take the first element of the array x and put x in a position such that all smaller elements (smaller than x) are before x, and put all greater elements (greater than x) after x.
3. Write a method ***duplicates(),***which calculate the frequencies of all the elements and display them.

4. Write a method ***circular(),*** which replace every element of the array by the sum of next two consecutive elements in a circular manner i.e.
   arr[0] = arr[1] + arr[2], arr[1] = arr[2] + arr[3], … arr[n – 1] = arr[0] + arr[1].
5. Write a method ***shiftCircular(),*** which shifts an array circularly left by two positions. Thus, if p[0] = 15, p[1]= 30, p[2] = 28, p[3]= 19 and p[4] = 61 then after the shift p[0] = 28, p[1] = 19, p[2] = 61, p[3] = 15 and p[4] = 30.

Question – 10:

Write a JAVA program to ask the rows and columns of first matrix then rows and columns of second matrix. Accept data of these matrices and find multiplication of these matrices if possible.