National University of Computer and Emerging Sciences, Lahore Campus

	Course:	**Programming Fundamentals**	**Course Code:**	**CS1002**
	Program:	**BS(Computer Science)**	**Semester:**	**Fall 2023**
	Duration:	**N/A**	**Total Marks:**	**100**
	Due Date:	**October 21, 2023**	**CLO:**	
	Section:	**1K**	**Page(s):**	**3**
	Exam:	**Assignment 4**	**Roll No.**	

Instructions:

- *Late submissions will lead to negative marking and submissions after 24 hours past the due time will not be accepted.*
- *This is an individual assignment and the solution submitted must be your own.*
- *Any sort of plagiarism will be dealt with seriously and may lead to severe consequences including negative marking.*
- *Use of advance concepts that have not been taught in class is strictly prohibited.*
- *Submit .cpp files (non commented) named as XXL-XXXX_Q#X.cpp*

QUESTION 1: (15+15+10+20)

Write C++ programs to print the following patterns of a size provided by the user.

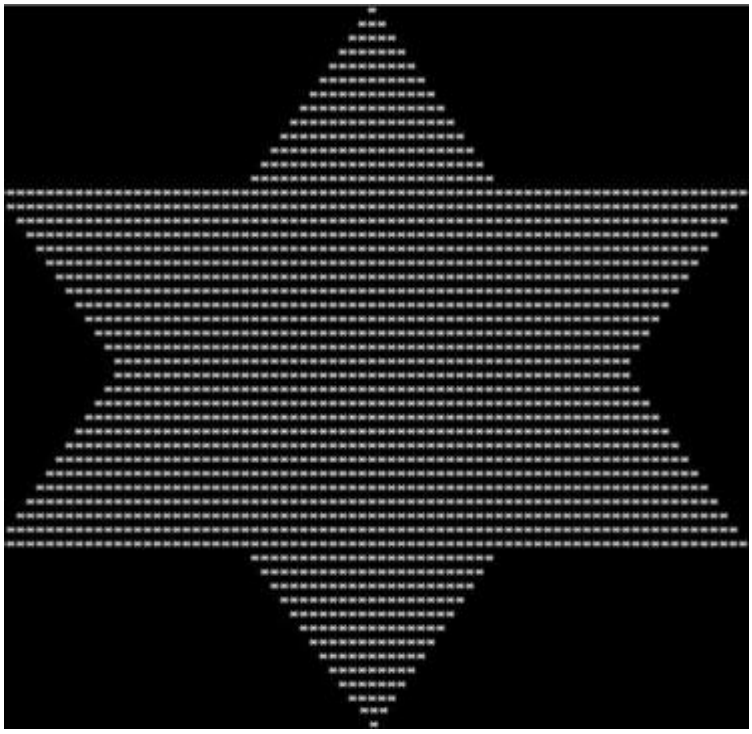
A.

B.

C.

```
            1
          1   1
        1   2   1
      1   3   3   1
    1   4   6   4   1
  1   5   10  10  5   1
```

D.



QUESTION 2: (10)

Write a program to determine sin(x) using nested loop. The user needs to provide x and a positive number of computations (number of terms that will be used for the formula). We need to compute the sine of x using the series: **sin (x) = x - x^3/3! + x^5/5! - x^7/7! + x^9/9! .....**

Sample Output:

```
Enter the value of x (in radians): 1.570796
Enter number of computations:      10

sin (1.5708) = 1
```

QUESTION 3: (10)

Develop a program to find all unique combinations of three positive integers from that sum up to a given number.

Sample Output:

```
Enter the number: 13

Unique Combinations are:
1 + 2 + 10 = 13
1 + 3 + 9 = 13
1 + 4 + 8 = 13
1 + 5 + 7 = 13
2 + 3 + 8 = 13
2 + 4 + 7 = 13
2 + 5 + 6 = 13
3 + 4 + 6 = 13
```

QUESTION 4: (10)

Write a program to form the following pattern for a given positive size (here size = 4):

```
+/\/\+
|    |
|    |
+\/\/+
```

Sample Output:

```
Enter size: 7
+/\/\/\/\/\+
|           |
|           |
|           |
|           |
|           |
+\/\/\/\/\/+
```

QUESTION 5: (10)

Write a program to find all prime numbers within a given range.

Sample Output:

Enter starting number: 1
Enter ending number: 10
Prime Numbers are: 2, 3, 5, 7