CL-1002
Programming Fundamentals
Lab # 11

Objectives:

- Practice and understanding on basic c++ programs

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential.
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of **every task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **23F-1234_Task1.cpp.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your word file in this format **23F-1234_L1.docx**
12. Do not submit your assignment **after the deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

Problem: 1 | Switch Case, Nested Loop, single Loop

Make a menu that asks the user for the following options.

1. Square with asterisk
2. Square with numbers in increasing order (input square number limit from user)
   Hint: 1, 4, 9, 16…n^2
3. Square with numbers in decreasing order (input square number limit from user)

Problem: 2 | Nested Loop, Patterns

Make a menu driven that prints the following patterns

```
11111
22222
33333
44444
55555

12345
12345
12345
12345
12345

55555
44444
33333
22222
11111

54321
54321
54321
54321
54321
```

Problem: 3 | Nested Loop, Pyramid

Make the following pyramid.

```
  *
 ***
```

```
 *****
*******
```

Also make inverted pyramid.

Problem: 4 |

(Diamond of Asterisks) Write a program that prints the following diamond shape. You may use output statements that print a single asterisk (*), a single blank or a single newline. Maximize your use of repetition (with nested for statements) and minimize the number of output statements.
Note: The size of diamond should be user defined.

```
   *
  ***
 *****
*******
 *****
  ***
   *
```

Problem: 5 | Nested Loop, Hollow Diamond

Consider the diamond in problem 4. Make a hollow diamond

Problem: 6 |

Write a C++ program using while loop that will print the pattern as shown below

```
1
2= =1
3= =2= =1
4= =3= =2= =1
5= =4= =3= =2= =1
6= =5= =4= =3= =2= =1
7= =6= =5= =4= =3= =2= =1
8= =7= =6= =5= =4= =3= =2= =1
9= =8= =7= =6= =5= =4= =3= =2= =1
```

Problem: 7 | Factory Production Line

You are tasked with creating a program to simulate a factory production line. The production line consists of multiple machines, each performing a specific task on the products passing through.
Write a program using nested loops to simulate the production line. The user should input the number of products to be processed, and the program should output the details of each product's journey through the machines.

Each product goes through three machines with the following tasks:

1. Machine A: Adds a component to the product. (1 for added, 0 for not added)
2. Machine B: Checks the quality of the product. (if added then 1 for passed, 0 for failed)
3. Machine C: Packages the product.(if passed then 1 for packaged, 0 for discarded)

For example, if the user inputs 4 products, the program should output something like
Product 1:
- Machine A: Component added.
- Machine B: Quality checked, passed.
- Machine C: Packaged.

Product 2:
- Machine A: Component added.
- Machine B: Quality checked, failed.
- Machine C: Discarded.

Product 3:
- Machine A: Component added.
- Machine B: Quality checked, passed.
- Machine C: Packaged.

Product 4:
- Machine A: Component added.
- Machine B: Quality checked, passed.
- Machine C: Packaged.

Problem: 8 | Product management system

Write a program to implement a management system. First create the number of categories then each category contains sub-categories, and each subcategory contains different number of products, and each product are different variations.

For example:

Enter number of categories: 4
    Enter Category 1 subcategories: 2
        Enter number of products of subcategory 1: 4

    For Category 1 Subcategory 1
        Enter variation of product 1: 3
        Enter variation of product 2: 2
        Enter variation of product 3: 5
        Enter variation of product 4: 1

        Enter number of products of subcategory 2: 2
    For Category 1 Subcategory 1
        Enter variation of product 1: 3
        Enter variation of product 2: 2
        .

.
.

Note: Use nested loops.