CL-1002
Programming Fundamentals
Lab # 10

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 No 1| For loop

When you borrow money to buy a house, a car, or for some other purpose, you repay the loan by making periodic payments over a certain period of time. Of course, the lending company will charge interest on the loan. Every periodic payment consists of the interest on the loan and the payment toward the principal amount. To be specific, suppose that you borrow $1000 at the interest rate of 7.2% per year and the payments are monthly.

Suppose that your monthly payment is $25. Now, the interest is 7.2% per year and the payments are monthly, so the interest rate per month is 7.2/12 = 0.6%. The first month's interest on $1000 is 1072 * 0.006 = 6. Because the payment is $25 and interest for the first month is $6.43, the payment toward the principal amount is 25 + 6.43 = 31.43. This means after making the first payment, the loan amount is 1072 – 31.43 = 1040.57. For the second payment, the interest is calculated on $981. So, the interest for the second month is 1040.57 * 0.006 = 6.243, that is, approximately $6.24. This implies that the payment toward the principal is 25 + 6.24 = 31.24 and the remaining balance after the second payment is 1040.57 – 31.24 = 1009.32. This process is repeated until the loan is paid.

Write a program that accepts as input the loan amount, the interest rate per year, and the monthly payment. (Enter the interest rate as a percentage. For example, if the interest rate is 7.2% per year, then enter 7.2.) The program then outputs the number of months it would take to repay the loan. (Note that if the monthly payment is less than the first month's interest, then after each payment, the loan amount will increase. In this case, the program must warn the borrower that the monthly payment is too low, and with this monthly payment, the loan amount could not be repaid.)

Problem No 2| loops

A criticism of the break and continue statements is that each is unstructured. These statements can always be replaced by structured statements. Describe in general how you'd remove any break statement from a loop in a program and replace it with some structured equivalent. [**Hint**: The break statement leaves a loop from within the body of the loop.

Another way to leave is by failing the loop-continuation test. Consider using in the loop-continuation test a second test that indicates "early exit because of a 'break' condition."]

1. Use the technique you developed here to remove the break statement from the program of

```
1  // Fig. 5.13: fig05_13.cpp
2  // break statement exiting a for statement.
3  #include <iostream>
4  using namespace std;
5
6  int main()
7  {
8     int count; // control variable also used after loop terminates
9
10    for ( count = 1; count <= 10; ++count ) // loop 10 times
11    {
12       if ( count == 5 )
13          break; // break loop only if count is 5
14
15       cout << count << " ";
16    } // end for
17
18    cout << "\nBroke out of loop at count = " << count << endl;
19 } // end main
```

2. Use the technique you developed here to remove the continue statement from the program of

```
1  // Fig. 5.14: fig05_14.cpp
2  // continue statement terminating an iteration of a for statement.
3  #include <iostream>
4  using namespace std;
5
6  int main()
7  {
8     for ( int count = 1; count <= 10; ++count ) // loop 10 times
9     {
10       if ( count == 5 ) // if count is 5,
11          continue;      // skip remaining code in loop
12
13       cout << count << " ";
14    } // end for
15
16    cout << "\nUsed continue to skip printing 5" << endl;
17 } // end main
```

Problem: 3 | While, do While

Consider the following two loops

a.
```
i = 11;
while (i <= 10)
{
    cout << i << " ";
    i = i + 5;
}
cout << endl;
```

b.
```
i = 11;
do
{
    cout << i << " ";
    i = i + 5;
}
while (i <= 10);

cout << endl;
```

Write two different programs that display the outputs of above mention code and also explain difference between them on word file.

Problem: 4 | do-while

Write a program using do-while that display the number between 1 and 100 by getting input from user. If number is less than 1 or greater than 100 than input again from user.

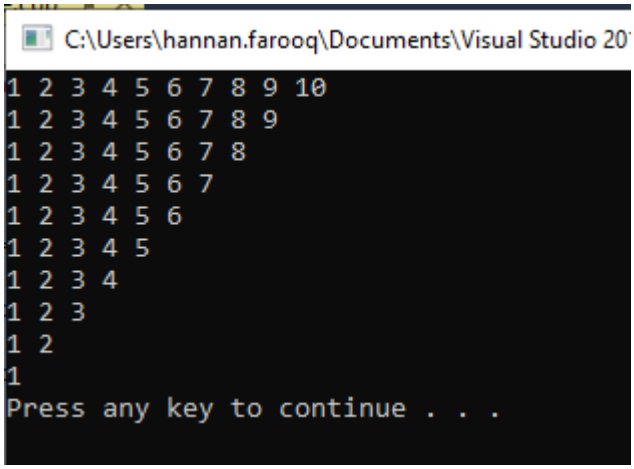
Problem: 5 | for loop

The population of a town A is less than the population of town B. However, the population of town

A is growing faster than the population of town B. Write a program that prompts the user to enter the population and growth rate of each town. The program outputs after how many years the population of town A will be greater than or equal to the population of town B and the populations of both the towns at that time. (A sample input is: Population of town A = 5000, growth rate of town A = 4%, population of town B = 8000, and growth rate of town B = 2%.).

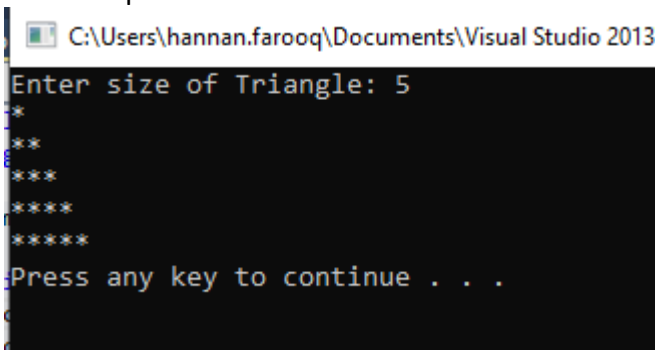
Problem: 6 | Nested Loop

Write a program display same output given below



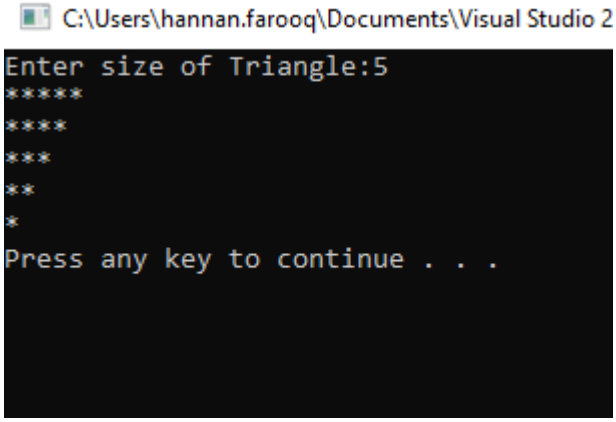
Problem: 7 | Nested Loop, Triangle variation 1

Make the following triangle with asterisk. Also, the size of the triangle will be defined by user
For Example



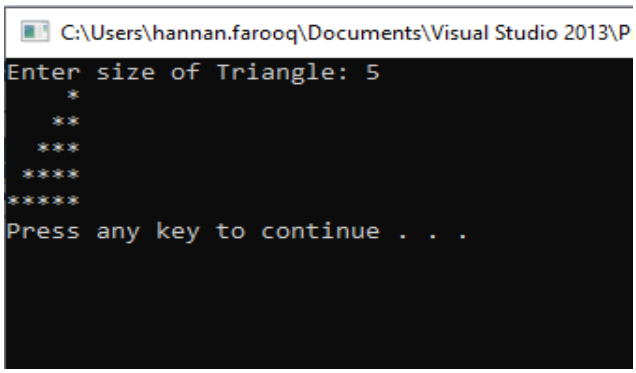
Problem: 8 | Nested Loop, Triangle variation 2

Make the following triangle with asterisk. Also, the size of the triangle will be defined by user
For Example



Problem: 9 | Nested Loop, Triangle variation 3

Make the following triangle with asterisk. Also, the size of the triangle will be defined by user
For Example



Problem: 10 | Nested Loop, Triangle variation 4

Make the following triangle with asterisk. Also, the size of the triangle will be defined by user
For Example