Program1:

Type the following program in the editor of the C++ environment. Compile the program and run it.

```c++
#include<iostream>
using namespace std;

int main()
{
    int a=1;
    do
    {
        cout << a << endl;
        a++;
    }
    while(a<=10);

cout << endl;
system("PAUSE");
    return 0;
}
```

Exercise Program1:

Write a program that calculates factorial of a given number that inputs from the keyboard.
Program2:

Suppose that the following data is in the file Ch5_LoopWithBugsData.txt.

87 78 83 94
23 89 92 70
92 78 34 56

The objective is to find the sum of the numbers in each line. For each line, output the numbers together with their sum. Let us consider the following program:

```cpp
#include <iostream>
#include <fstream>

using namespace std;

int main()
{
    ifstream infile;

    int i;
    int j;
    int sum;
    int num;

    infile.open("Ch5_LoopWithBugsData.txt");

    for (i = 1; i <= 3; i++)
    {
        sum = 0;

        for (j = 1; j <= 4; j++)
        {
            infile >> num;
            cout << num << " ";
            sum = sum + num;
        }

        cout << "sum = " << sum << endl;
    }

    return 0;
}
```

Sample Run:

87 78 83 94 sum = 342
23 89 92 70 sum = 274
92 78 34 56 sum = 260
Assignment:

Question 1: Type the following program in the editor of the C++ environment. Compile the program and run it.

```cpp
#include <iostream>

using namespace std;

int main()
{
    int num, temp, sum;
    cout << "Enter a positive integer: ";
    cin >> num;
    cout << endl;
    temp = num;
    sum = 0;
    do
    {
        sum = sum + num % 10;            //extract the last digit and add it to sum
        num = num / 10;                  //remove the last digit
    }
    while (num > 0);
    cout << "The sum of the digits = " << sum << endl;
    if (sum % 3 == 0)
    {
        cout << temp << " is divisible by 3" << endl;
    }
    else
    {
        cout << temp << " is not divisible by 3" << endl;
    }
    if (sum % 9 == 0)
    {
        cout << temp << " is divisible by 9" << endl;
    }
    else
    {
        cout << temp << " is not divisible by 9" << endl;
    }
    cout << endl;
    system("PAUSE");
    return 0;
}
```

Question 2: Write a program that will generate the following output.

```
1
12
123
1234
12345
123456
1234567
12345678
123456789
```
Question 3: How many times will each of the following loops execute? What is the output in each case?

a. \(x = 5; y = 50;\)
   \[\text{do}\]
   \[x = x + 10;\]
   \[\text{while}\ (x < y);\]
   \[\text{cout} \ll x \ll " " \ll y \ll \text{endl;}\]

b. \(x = 5; y = 80;\)
   \[\text{do}\]
   \[x = x \ast 2;\]
   \[\text{while}\ (x < y);\]
   \[\text{cout} \ll x \ll " " \ll y \ll \text{endl;}\]

c. \(x = 5; y = 20;\)
   \[\text{do}\]
   \[x = x + 2;\]
   \[\text{while}\ (x >= y);\]
   \[\text{cout} \ll x \ll " " \ll y \ll \text{endl;}\]

Question 4: What is the output of the following program?

```cpp
#include <iostream>
using namespace std;
int main()
{
    int x, y, z;
    x = 4; y = 5;
    z = y + 6;
    do
    {
        cout \ll z \ll " ";
        z = z + 7;
    }
    while (((z - x) % 4) != 0);
    cout \ll \text{endl;}
    return 0;
}
```

Question 5:
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 \(B = 2\%\).)