



CS-114 - Fundamentals of Programming

Lab Manual # 02

Course Instructor: Dr Jawad Khan

Lab Instructor: Muhammad Affan

Student Name: Ayesha Khan

CMS ID: 478212

DATE:
30-09-23



Lab Manual # 02

Variables, Constants and Data types

Objective:

This lab is about familiarization with different data types, developing an understanding of variables and constants taking input from the user, showing output to the screen, and writing simple programs.

Lab Tasks:

Task 1:

Write a C++ code that displays your name, department, and degree on the console. Make sure the three things are in three different lines.

Code:

```
Inputformnumbers.cpp Task1.cpp
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      cout<<"Name: Ayesha Khan\n";
7      cout<<"Department: School of Mechanical and Manufacturing Engineering (SMME)\n";
8      cout<<"Degree: Bachelors of Mechanical Engineering\n";
9
10     return 0;
11 }
```

Output:

```
C:\Users\DME-CADCAM\Desktop\LabTasks.exe
Name: Ayesha Khan
Department: School of Mechanical and Manufacturing Engineering (SMME)
Degree: Bachelors of Mechanical Engineering
-----
Process exited after 0.01654 seconds with return value 0
Press any key to continue . . .
```



Task 2:

Write a C++ code that takes two numbers and displays the addition, subtraction, division, multiplication, and square of given numbers, on the console window. Make sure to comment your code.

Code:

```
1 #include <iostream>
2 using namespace std;
3 int main()
4 {
5     float num1, num2, res;
6     num1 = 8;
7     num2 = 7;
8     cout<<"First Number is 7\n";
9     cout<<"Second Number is 8\n";
10    res = num1 + num2;
11    cout<<"Addition Result = "<<res<<endl;
12    res = num1 - num2;
13    cout<<"Subtraction Result = "<<res<<endl;
14    res = num1 * num2;
15    cout<<"Multiplication result = "<<res<<endl;
16    res = num1/num2;
17    cout<<"Division Result = "<<res<<endl;
18    res = num1*num1;
19    cout<<"Square of First Number = "<<res<<endl;
20    res = num2*num2;
21    cout<<"Square of Second Number = "<<res<<endl;
22
23    return 0;
24 }
```

Output:

```
C:\Users\DME-CAD/CAM\Desktop\Inputformnumbers.exe
First Number is 7
Second Number is 8
Addition Result = 15
Subtraction Result = 1
Multiplication result = 56
Division Result = 1.14286
Square of First Number = 64
Square of Second Number = 49

-----
Process exited after 0.02038 seconds with return value 0
Press any key to continue . . .
```



Task 3:

Write a code in C++ that takes radius of a circle as input from user and outputs the circumference and area. The output should be clear and readable. Add proper comments to the code. You can set the value of π up to 3 decimal places.

Code:

```
1  #include <iostream>
2  using namespace std;
3  int main()
4  {
5      float pi = 3.1415f;
6      float r, a, c;
7      cout<<"Input the radius of the circle: ";
8      cin>>r;
9      cout<<endl;
10     c = 2*pi*r;
11     a = pi * r * r;
12     cout<<"Circumference of the circle is: "<<c<<endl;
13     cout<<"Area of the circle is: "<<a<<endl;
14
15     return 0;
16 }
```

Output:

C:\Users\DME-CADCAM\Desktop\Inputfornumbers.exe

```
Input the radius of the circle: 5
Circumference of the circle is: 31.415
Area of the circle is: 78.5375
-----
Process exited after 2.161 seconds with return value 0
Press any key to continue . . .
```



Task 4:

Write a C++ code that prints out the following sequence: 0, 1, 1, 2, 3, 5, 8, 13 using three variables.

Code:

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      int first, second, sum;
7      first = 0;
8      second = 1;
9      sum = first + second;
10     cout<<first<<"", "<<second<<"", "<<sum;
11     first = second;
12     sum = first + second;
13     cout<<"", "<<sum;
14     second = sum;
15     sum = first + second;
16     cout<<"", "<<sum;
17     first = second;
18     second = sum;
19     sum = first + second;
20     cout<<"", "<<sum;
21     first = second;
22     second = sum;
23     sum = first + second;
24     cout<<"", "<<sum;
25     first = second;
26     second = sum;
27     sum = first + second;
28     cout<<"", "<<sum;
29
30     return 0;
31 }
```



Output:

```
C:\Users\DME-CADCAM\Desktop\LabTasks.exe
0, 1, 1, 2, 3, 5, 8, 13
-----
Process exited after 0.03313 seconds with return value 0
Press any key to continue . . .
```

Home Tasks:

Task 1:

Write a C++ program to calculate the distance between two points. The values of coordinates should be input by the user.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Code:

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      //declaring variables
7      float x1, y1, x2, y2, x, y, d;
8      //Using cin to get values of x1, x2, y1 and y2 from the user, and then displaying the value of difference of coordinates using cout
9      cout<<"Enter the value of x1: ";
10     cin>>x1;
11     cout<<"Enter the value of x2: ";
12     cin>>x2;
13     x = x2 - x1;
14     cout<<"x2 - x1 = "<<x<<endl;
15     cout<<"Enter value of y1: ";
16     cin>>y1;
17     cout<<"Enter value of y2: ";
18     cin>>y2;
19     y = y2 - y1;
20     cout<<"y2 - y1 = "<<y<<endl;
21     //d is the distance formula between the two points. Using cout to display the distance between the points
22     d = (x*x) + (y*y);
23     cout<<"The distance between the two points is given by: ("<<x<<"*("<<x<<")"<< + ("<<y<<"*("<<y<<") = "<<d<<" units"<<endl;
24
25     return 0;
26
27 }
```



Output:

```
C:\Users\ayesh\Desktop\1st s... X + v
Enter the value of x1: 6
Enter the value of x2: 7
x2 - x1 = 1
Enter value of y1: 3
Enter value of y2: 8
y2 - y1 = 5
The distance between the two points is given by: (1*1) + (5*5) = 26

-----
Process exited after 24.81 seconds with return value 0
Press any key to continue . . .
```

Task 2:

Write a code in C++ to take the length from the user in centimeters and convert it into meters and kilometers.

Code:

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      //Declaring variables
7      float cm, m, km;
8      //Inputing length in centimeters from the user
9      cout<<"Enter the length in centimeters: ";
10     cin>>cm;
11
12     //Calculating length in meters and kilometers
13     m = cm * 0.01;
14     km = cm * 0.00001;
15
16     //Displaying those lengths
17     cout<<"Length in meters is: "<<m<<"m"<<endl;
18     cout<<"Length in kilometers is: "<<km<<"km"<<endl;
19
20     return 0;
21 }
```




Output:

```
C:\Users\ayesh\Desktop\1st s  X + v
Enter the length in centimeters: 60
Length in meters is: 0.6m
Length in kilometers is: 0.0006km

-----
Process exited after 2.835 seconds with return value 0
Press any key to continue . . . |
```

Task 3:

Write a code in C++ that takes values of a and b from the user and displays the result of a polynomial $a^2 + 2ab + b^2$.

Code:

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      cout<<"Sum of Squares formula is given by: a^2 + 2ab + b^2"<<endl;
7      //Declaring the variables
8      float a, b, p;
9
10     //Using cout and cin to input the values of a and b from the user
11     cout<<"Enter the value of a: ";
12     cin>>a;
13     cout<<"Enter the value of b: ";
14     cin>>b;
15
16     //Calculating the value of the polynomial
17     p = (a*a) + (2*a*b) + (b*b);
18
19     //Displaying the value of the polynomial
20     cout<<"Result of the Sum of Squares formula is: "<<p;
21
22
23     return 0;
24 }
```




Output:

```
C:\Users\ayesh\Desktop\1st s... X + v
Sum of Squares formula is given by: a^2 + 2ab + b^2
Enter the value of a: 4
Enter the value of b: 8
Result of the Sum of Squares formula is: 144
-----
Process exited after 4.234 seconds with return value 0
Press any key to continue . . . |
```

Task 4:

Write a program in C++ to convert temperature in Fahrenheit to Celsius.

Code:

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      cout<<"Temperature in Fahrenheit to Celsius"<<endl;
7
8      //Declaring variables for temperature in fahrenheit and celsius
9      double fahrenheit, celsius;
10
11     //Inputting temperature in Fahrenheit from the user
12     cout<<"Enter the temperature in fahrenheit: ";
13     cin>>fahrenheit;
14
15     //Formula for fahrenheit to celsius conversion
16     celsius = (fahrenheit - 32.0) * 5.0 / 9.0;
17
18     //Displaying the corresponding temperature in Fahrenheit
19     cout<<"The corresponding temperature in celsius is: "<<celsius<<endl;
20
21     return 0;
22 }
23
```



Output:

```
C:\Users\ayesh\Desktop\1st s... X + v
Temperature in Fahrenheit to Celsius
Enter the temperature in fahrenheit: 57.8
The corresponding temperature in celsius is: 14.3333

-----
Process exited after 5.538 seconds with return value 0
Press any key to continue . . .
```

Conclusion:

In this lab, I learned how to use cout and cin to display something and to get input from the user. I also learned different data types and when and where to use them. I learned how to perform different arithmetic operations in C++ as well.