



**NUST**  
NATIONAL UNIVERSITY  
OF SCIENCES & TECHNOLOGY

## **FUNDAMENTALS OF PROGRAMMING**

### **HOME TASKS**

**(Manual 01 and 02)**

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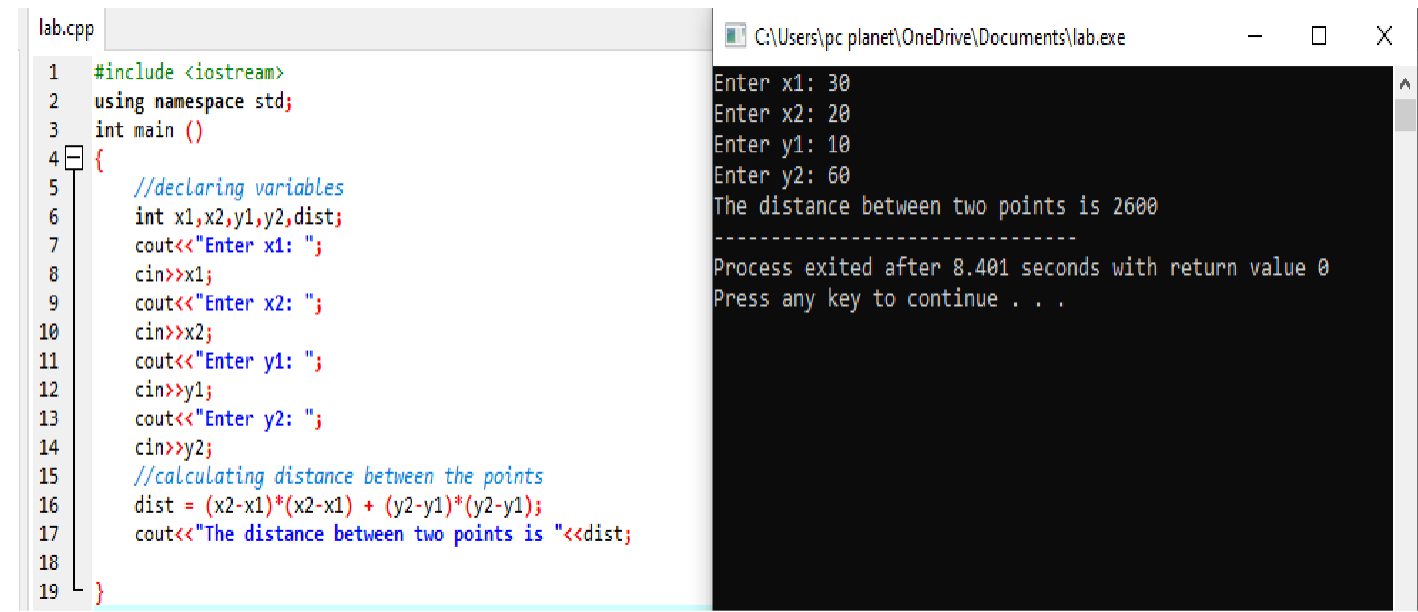
**CMS ID#** 467578

**Section:** C

# Manual 01

## Task 01:

Program to calculate distance between two points input by user:-



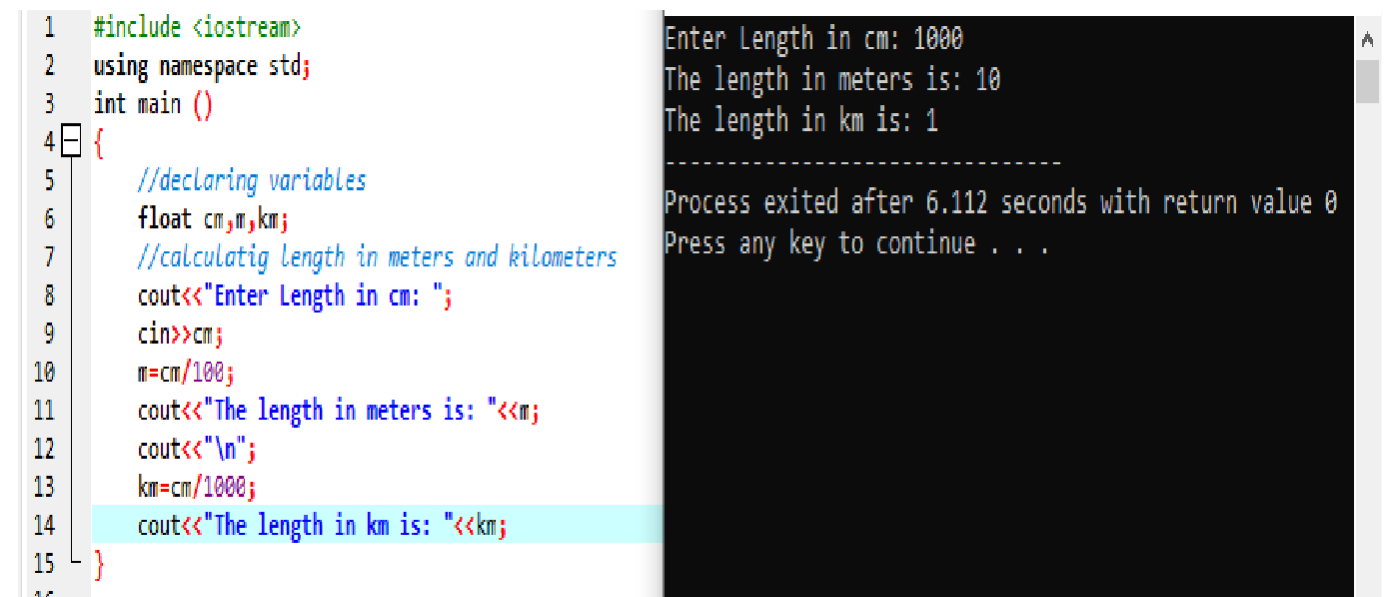
The screenshot shows a C++ program in a file named 'lab.cpp' and its execution output in a console window. The program calculates the distance between two points (x1, y1) and (x2, y2) using the formula:  $\text{dist} = (x2 - x1)^2 + (y2 - y1)^2$ . The user inputs x1=30, x2=20, y1=10, and y2=60, resulting in a distance of 2600.

```
lab.cpp
1  #include <iostream>
2  using namespace std;
3  int main ()
4  {
5      //declaring variables
6      int x1,x2,y1,y2,dist;
7      cout<<"Enter x1: ";
8      cin>>x1;
9      cout<<"Enter x2: ";
10     cin>>x2;
11     cout<<"Enter y1: ";
12     cin>>y1;
13     cout<<"Enter y2: ";
14     cin>>y2;
15     //calculating distance between the points
16     dist = (x2-x1)*(x2-x1) + (y2-y1)*(y2-y1);
17     cout<<"The distance between two points is "<<dist;
18
19 }
```

```
C:\Users\pc planet\OneDrive\Documents\lab.exe
Enter x1: 30
Enter x2: 20
Enter y1: 10
Enter y2: 60
The distance between two points is 2600
-----
Process exited after 8.401 seconds with return value 0
Press any key to continue . . .
```

## Task 02:

Code to convert length from cm to m and km:-



The screenshot shows a C++ program in a file named 'lab.cpp' and its execution output in a console window. The program converts a length from centimeters (cm) to meters (m) and kilometers (km). The user inputs 1000 cm, resulting in 10 meters and 1 kilometer.

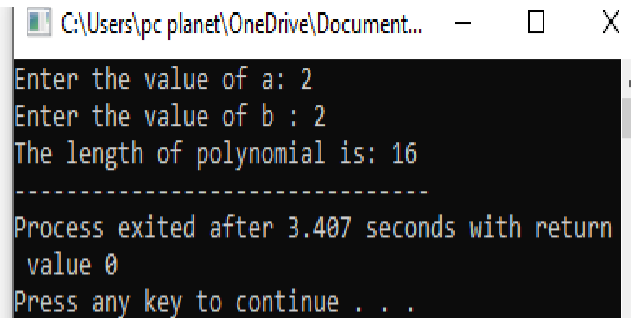
```
lab.cpp
1  #include <iostream>
2  using namespace std;
3  int main ()
4  {
5      //declaring variables
6      float cm,m,km;
7      //calculatig length in meters and kilometers
8      cout<<"Enter Length in cm: ";
9      cin>>cm;
10     m=cm/100;
11     cout<<"The length in meters is: "<<m;
12     cout<<"\n";
13     km=cm/1000;
14     cout<<"The length in km is: "<<km;
15 }
```

```
Enter Length in cm: 1000
The length in meters is: 10
The length in km is: 1
-----
Process exited after 6.112 seconds with return value 0
Press any key to continue . . .
```

### **Task 03:**

Code that takes values of a and b from user and displays value of polynomial  $a^2 + 2ab + b^2$

```
1  #include <iostream>
2  using namespace std;
3  int main ()
4  {
5      //declaring variables
6      int a,b,ab,polynomial;
7      cout<<"Enter the value of a: ";
8      cin>>a;
9      cout<<"Enter the value of b : ";
10     cin>>b;
11     //specifying the value of ab
12     ab = a*b;
13     //entering the formula of the polynomial
14     polynomial = a*a + 2*ab + b*b;
15     cout<<"The length of polynomial is: "<<polynomial;
16 }
```

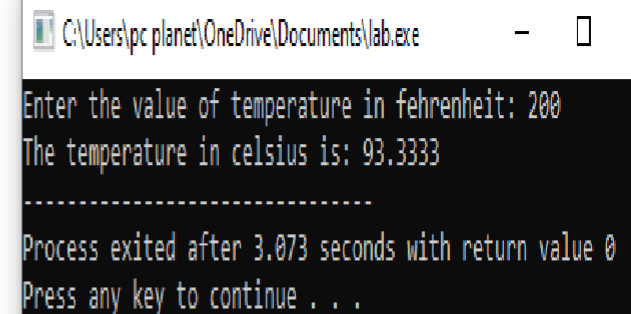


```
C:\Users\pc planet\OneDrive\Document...
Enter the value of a: 2
Enter the value of b : 2
The length of polynomial is: 16
-----
Process exited after 3.407 seconds with return
value 0
Press any key to continue . . .
```

### **Task 04:**

Code to convert temperature from Fehrenheit to Celsius:-

```
1  #include <iostream>
2  using namespace std;
3  int main ()
4  {
5      //declaring variables
6      float F,C;
7      cout<<"Enter the value of temperature in fehrenheit: ";
8      cin>>F;
9      //entering the formula for conversion
10     C= (F -32) * 5/9;
11     cout<<"The temperature in celsius is: "<<C;
12     return 0;
13 }
14
```



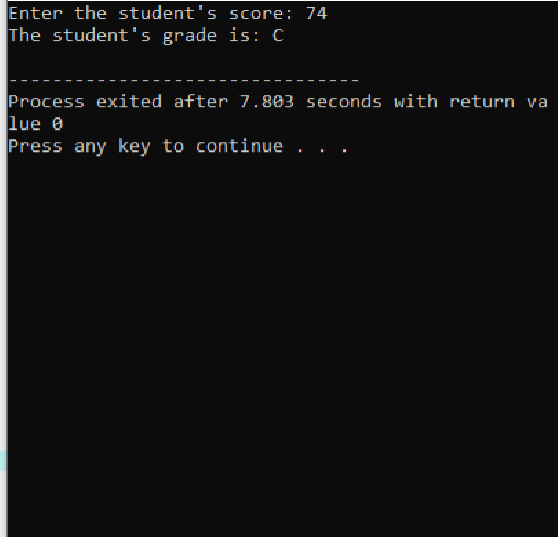
```
C:\Users\pc planet\OneDrive\Documents\lab.exe
Enter the value of temperature in fehrenheit: 200
The temperature in celsius is: 93.3333
-----
Process exited after 3.073 seconds with return value 0
Press any key to continue . . .
```

## Manual 02

### TASK 01:

Program that takes student's score as input and assigns grade based on predefined criteria:-

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     //declaring variables
6     int score;
7     char grade;
8
9     cout << "Enter the student's score: ";
10    cin >> score;
11    //specifying the criteria for grading
12    if (score >= 90) {
13        grade = 'A';
14    } else if (score >= 75) {
15        grade = 'B';
16    } else if (score >= 60) {
17        grade = 'C';
18    } else if (score >= 45) {
19        grade = 'D';
20    } else {
21        grade = 'F';
22    }
23    //printing the grades
24    cout << "The student's grade is: " << grade << endl;
25
26    return 0;
}
```



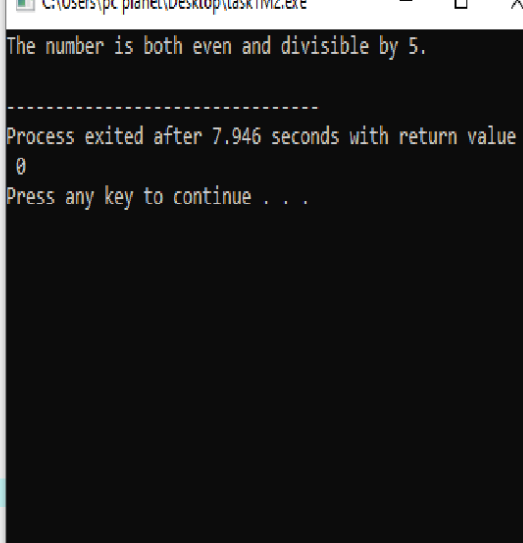
Enter the student's score: 74  
The student's grade is: C

-----  
Process exited after 7.803 seconds with return value 0  
Press any key to continue . . .

### TASK 02:

Program that takes an integer as input and determines if it is both even and divisible by 5:-

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int num;
6
7     cout << "Enter an integer: ";
8     cin >> num;
9
10    if (num % 2 == 0 && num % 5 == 0)
11    {
12        cout << "The number is both even and divisible by 5." << endl;
13    }
14    else {
15        cout << "The number is not both even and divisible by 5." << endl;
16    }
17
18    return 0;
19 }
20
```



The number is both even and divisible by 5.

-----  
Process exited after 7.946 seconds with return value 0  
Press any key to continue . . .

## **TASK 03:**

Code that checks if the user-provided year is a leap year:-

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

int main()
//declaring variable
{
    int year;
    cout << "Enter a year: ";
    cin >> year;
    //specifying the condition for leap year
    if ((year % 4 == 0 && year % 100 != 0) || year % 400 == 0)
    {
        cout << year << " is a leap year." << endl;
    }
    else {
        cout << year << " is not a leap year." << endl;
    }

    return 0;
}
```

```
Enter a year: 2024
2024 is a leap year.

-----
Process exited after 3.303 seconds with return value 0
Press any key to continue . . .
```

## **TASK 04:**

Program that determines if a student is eligible for scholarship on basis of CGPA and attendance:-

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  //declaring the variables
6  {
7      float gpa;
8      int attendance;
9      //getting the user input
10
11      cout << "Enter student's GPA: ";
12      cin >> gpa;
13
14      cout << "Enter student's attendance percentage: ";
15      cin >> attendance;
16      //providing the conditions for eligibility of scholarship
17      if (gpa >= 3.5 && attendance >= 80) {
18          cout << "The student is eligible for the scholarship." << endl;
19      }
20      else {
21          cout << "The student is not eligible for the scholarship." << endl;
22      }
23
24      return 0;
25 }
```

```
Enter student's GPA: 3.6
Enter student's attendance percentage: 87
The student is eligible for the scholarship.

-----
Process exited after 12.44 seconds with return value 0
Press any key to continue . . .
```

## **TASK 05:**

Code that checks if a given character is a vowel or a consonant using logical gates:-

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      //declaring variable
7      char character;
8      //taking user input
9      cout << "Enter a character: ";
10     cin >> character;
11     // Convert the character to lowercase for easier comparison
12     character = tolower(character);
13
14     if (character == 'a' || character == 'e' || character == 'i' || character == 'o' || character == 'u')
15     {
16         cout << "The character is a vowel." << endl;
17     }
18     else {
19         cout << "The character is a consonant." << endl;
20     }
21
22     return 0;
23 }
```

The character is a consonant.

-----  
Process exited after 2.85 seconds with return  
value 0  
Press any key to continue . . .