Lab Manual 1

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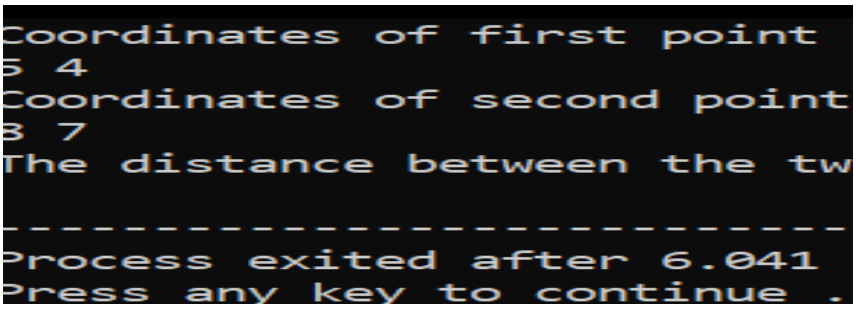
Q1. Write a C++ program to calculate distance between two points. The values of coordinates should be input by user.

Task1.cpp

```cpp
#include <iostream>
#include <cmath>

using namespace std;

int main() {
    float x1, y1, x2, y2;

    cout << "Coordinates of first point (x1 y1): "<<endl;
    cin >> x1 >> y1;

    cout << "Coordinates of second point (x2 y2): "<<endl;
    cin >> x2 >> y2;

    //Calculate the distance using the distance formula
    float distance = sqrt(pow(x2 - x1, 2) + pow(y2 - y1, 2));

    cout << "The distance between the two points is: " << distance << endl;

    return 0;
}
```

Output



Q2. Write a code in C++ to take length from user in centimeter and convert it into meter and kilometer.

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

int main()
{
    float centimeters, meters, kilometers;

    cout << "Enter the length in centimeters: ";
    cin >> centimeters;

    meters = centimeters / 100.0;
    kilometers = centimeters / 100000.0;

    cout << "Length in meters: " << meters << " meters" << endl;
    cout << "Length in kilometers: " << kilometers << " kilometers" << endl;

    return 0;
}
```

Output

```
Enter the length in centimeters: 654
Length in meters: 6.54 meters
Length in kilometers: 0.00654 kilometers

--------------------------------
Process exited after 5.996 seconds with return value 0
Press any key to continue . . .
```

Q3. Write a code in C++ that takes values of a and b from the user and displays result of polynomial a ^ 2 + 2ab + b ^ 2.

```cpp
#include <iostream>

using namespace std;
int main()
{
    float a, b;

    cout << "Enter the value of 'a': ";
    cin >> a;

    cout << "Enter the value of 'b': ";
    cin >> b;

    float result = a * a + 2 * a * b + b * b;

    cout << "Result of the polynomial a^2 + 2ab + b^2 with a = " << a << " and b = " << b << " is: " << result << endl;

    return 0;
}
```

Output

```
nter the value of 'a': 3
nter the value of 'b': 4
esult of the polynomial a^2 + 2ab + b^2 with a = 3 and b = 4 is: 49

--------------------------------
rocess exited after 3.748 seconds with return value 0
ress any key to continue . . .
```

Q4. Write a program in C++ to convert temperature in Fahrenheit to Celsius

```cpp
#include <iostream>

using namespace std;

int main() {
    float fahrenheit, celsius;

    cout << "Enter temperature in Fahrenheit: ";
    cin >> fahrenheit;

    // Convert Fahrenheit to Celsius
    celsius = (fahrenheit - 32) * 5.0/9.0;

    cout << "Temperature in Celsius: " << celsius << " degrees Celsius" << endl;

    return 0;
}
```

Output

```
Enter temperature in Fahrenheit: 87
Temperature in Celsius: 30.5556 degrees Celsius

--------------------------------
Process exited after 3.236 seconds with return value 0
Press any key to continue . . .
```

Lab Manual 2

Home Task

Q1. Write a program that determines if a person is eligible to vote based on their age (e.g, 18 years or older) using logical operators

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

int main()
{
    int age;

    cout << "Enter your age: ";
    cin >> age;

    if (age >= 18) {
        cout << "You are eligible to vote!" << endl;
    } else {
        cout << "You are not eligible to vote." << endl;
    }

    return 0;
}
```

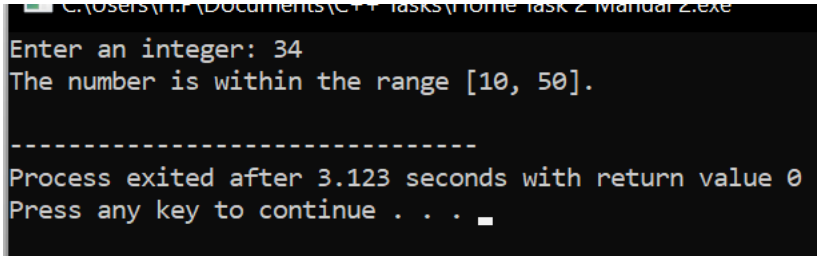
Output

```
Enter your age: 23
You are eligible to vote!

--------------------------------
Process exited after 2.592 seconds with return value 0
Press any key to continue . . .
```

Q2. Write a program that takes an integer as input and checks if it falls within the range [10,50] using logical operators

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

int main()
 {
    int number;

    cout << "Enter an integer: ";
    cin >> number;

    if (number >= 10 && number <= 50)
     {
        cout << "The number is within the range [10, 50]." << endl;
    } else {
        cout << "The number is outside the range [10, 50]." << endl;
    }

    return 0;
}
```

Output



Q3. Write a C++ program to compare two integers and find the maximum value

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

int main()
{
    int num1, num2;
    cout << "Enter the first number: ";
    cin >> num1;
    cout << "Enter the second number: ";
    cin >> num2;

    int max_value;

    if (num1 > num2) {
        max_value = num1;
    } else {
        max_value = num2;
    }
    cout << "The maximum value is: " << max_value << endl;

    return 0;
}
```

Output

```
Enter the first number: 4
Enter the second number: 6
The maximum value is: 6

--------------------------------
Process exited after 3.427 seconds with return value 0
Press any key to continue . . .
```

Q4. Write a C++ program to calculate the average of three exam scores and determine if it's above a passing grade (e.g., average >= 60

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

int main()
{
    float score1, score2, score3;
    cout << "Enter the first exam score: ";
    cin >> score1;
    cout << "Enter the second exam score: ";
    cin >> score2;
    cout << "Enter the third exam score: ";
    cin >> score3;
    float average = (score1 + score2 + score3) / 3.0;
    if (average >= 60) {
        cout << "The average score is " << average << " which is above the passing grade." << endl;
    } else {
        cout << "The average score is " << average << " which is below the passing grade." << endl;
    }

    return 0;
}
```

Output

```
Enter the first exam score: 86
Enter the second exam score: 56
Enter the third exam score: 98
The average score is 80 which is above the passing grade.

--------------------------------
Process exited after 8.9 seconds with return value 0
Press any key to continue . . .
```

Lab Task

Q1. Create a program that takes a student's score as input and assigns a grade based on predefined criteria using logical operators (e.g., A, B, C, D, F).

A-Grade: 90-100 Marks

B Grade: 75-90 Marks

C-Grade: 60-75 Marks

D-Grade: 45-60 Marks F-Grade: 0-45 Marks

```cpp
#include <iostream>
using namespace std;
int main() {
    int score;
    char grade;
    cout << "Enter the student's score: ";
    cin >> score;
    if (score >= 90 && score <= 100) {
        grade = 'A';
    } else if (score >= 75 && score < 90) {
        grade = 'B';
    } else if (score >= 60 && score < 75) {
        grade = 'C';
    } else if (score >= 45 && score < 60) {
        grade = 'D';
    } else if (score >= 0 && score < 45) {
        grade = 'F';
    } else {
        cout << "Invalid score entered. Please enter a score between 0 and 100." << endl;
        return 1;
    }
    cout << "The student's grade is: " << grade << endl;
    return 0;
}
```

Output

```
Enter the student's score: 75
The student's grade is: B

--------------------------------
Process exited after 4.474 seconds with return value 0
Press any key to continue . . .
```

Q2. Write a program that takes an integer as input and determines if it is both even and divisible by 5

```cpp
#include <iostream>
using namespace std;
int main() {
    int number;
    cout << "Enter an integer: ";
    cin >> number;
    if (number % 2 == 0 && number % 5 == 0) {
        cout << "The number is both even and divisible by 5." << endl;
    } else {
        cout << "The number is not both even and divisible by 5." << endl;
    }
    return 0;
}

```

Output

```
Enter an integer: 54
The number is not both even and divisible by 5.

--------------------------------
Process exited after 4.526 seconds with return value 0
Press any key to continue . . .
```

Q3. Create a C++ program that checks if a user-provided year is a leap year

```cpp
#include <iostream>
using namespace std;
int main() {
    int year;
    cout << "Enter a year: ";
    cin >> 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;
}
```

Output

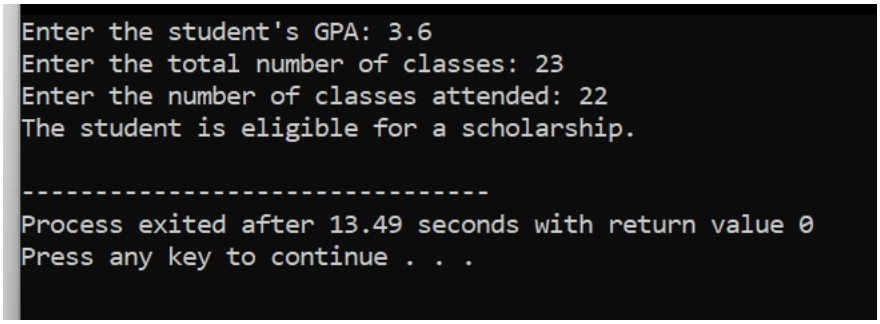
```
Enter a year: 2024
2024 is a leap year.

--------------------------------
Process exited after 10.45 seconds with return value 0
Press any key to continue . . .
```

Q4. Create a C++ program that determines if a student is eligible for a scholarship based on their GPA (must have GPA >= 3.5) and attendance (must have attended at least 80% of

classes)

```cpp
#include <iostream>
using namespace std;
int main() {
    double gpa;
    int totalClasses, attendedClasses;
    cout << "Enter the student's GPA: ";
    cin >> gpa;
    cout << "Enter the total number of classes: ";
    cin >> totalClasses;
    cout << "Enter the number of classes attended: ";
    cin >> attendedClasses;
    double attendancePercentage = (static_cast<double>(attendedClasses) / totalClasses) * 100.0;
    if (gpa >= 3.5 && attendancePercentage >= 80.0) {
        cout << "The student is eligible for a scholarship." << endl;
    } else {
        cout << "The student is not eligible for a scholarship." << endl;
    }
    return 0;
}
```

Output



Q5. Write a program that checks if a given character is a vowel (a, e, i, o, u) or a consonant using logical operators

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

int main() {
    char alphabet;
    cout<< "Please Enter The Alphabet:";
      cin>> alphabet;
      if (alphabet == 'a' || alphabet == 'e' || alphabet == 'i' || alphabet == 'o' || alphabet == 'u') {
          cout << "The character is a vowel." << endl;
      } else {
          cout << "The character is a consonant." << endl;
      }
    return 0;
}
```

Output

```
Please Enter The Alphabet:w
The character is a consonant.

--------------------------------
Process exited after 14.34 seconds with return value 0
Press any key to continue . . .
```