NATIONAL UNIVERSITY OF SCIENCE & TECNOLOGY

SCHOOL OF MECHANICAL AND MANUFACTURING ENGINEERING

[FUNDAMENTALS OF PROGRAMMING –(LAB)]

MANUAL # 10

SEMESTER # 01

CLASS: - ME-15 [SEC A]

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TASK NO.1

```
#include<bits/stdc++.h>
using namespace std;
int main(){

cout<<" The original vector is : "<<endl;
        vector<int> v;

        v.push_back(7);
        v.push_back(4);
        v.push_back(8);
        v.push_back(3);
        v.push_back(9);
        v.push_back(11);
        v.push_back(1);
        v.push_back(12);
        v.push_back(13);
        v.push_back(25);

        vector<int>::iterator it;
        for (it=v.begin(); it!=v.end();it++ ){
                cout<<*it<<" ";
        }
        cout<<endl;

v.erase(v.begin() + 4, v.begin()+5);
v.insert(  v.begin()+4, 5);

cout<<" New vector is : "<<endl;

        for (it=v.begin(); it!=v.end();it++ ){
                cout<<*it<<" ";
        }

        return 0;
}
```

```
 The original vector is :
7 4 8 3 9 11 1 12 13 25
 New vector is :
7 4 8 3 5 11 1 12 13 25
--------------------------------
```

TASK NO.2

```
#include <bits/stdc++.h>

using namespace std;

int main() {
   int num_pairs;
   cout << "Enter the number of name/grade pairs: ";
   cin >> num_pairs;

   vector<string> names(num_pairs);
   vector<int> grades(num_pairs);

   for (int i = 0; i < num_pairs; i++) {
      cout << "Enter name #" << i + 1 << ": ";
      cin >> names[i];
      cout << "Enter grade #" << i + 1 << ": ";
      cin >> grades[i];
   }

   double sum = 0;
   for (int i = 0; i < num_pairs; i++) {
      sum += grades[i];
   }
   double mean = sum / num_pairs;
   cout << "Mean grade: " << mean << endl;

   sort(grades.begin(), grades.end());
   double median;
   if (num_pairs % 2 == 0) {
      median = (grades[num_pairs / 2 - 1] + grades[num_pairs / 2]) / 2.0;
   } else {
      median = grades[num_pairs / 2];
   }
   cout << "Median grade: " << median << endl;

   map<int, int> freq;
   for (int i = 0; i < num_pairs; i++) {
      freq[grades[i]]++;
   }
   int mode = -1;
   int max_freq = -1;
   for (auto p : freq) {
```

```
        if (p.second > max_freq) {
            max_freq = p.second;
            mode = p.first;
        }
    }
    cout << "Mode grade: " << mode << endl;

    cout << "Names of students with mode as their grade: ";
    for (int i = 0; i < num_pairs; i++) {
        if (grades[i] == mode) {
            cout << names[i] << " ";
        }
    }
    cout << endl;

    return 0;
}
```

```
Enter the number of name/grade pairs: 4
Enter name #1: ali
Enter grade #1: 89
Enter name #2: talha
Enter grade #2: 76
Enter name #3: nouman
Enter grade #3: 90
Enter name #4: abdullah
Enter grade #4: 80
Mean grade: 83.75
Median grade: 84.5
Mode grade: 76
Names of students with mode as their grade: ali
```

```
Enter the number of name/grade pairs: 3
Enter name #1: ALI
Enter grade #1: 40
Enter name #2: AHMAD
Enter grade #2: 30
Enter name #3: AKBAR
Enter grade #3: 90
Mean grade: 53.3333
Median grade: 40
Mode grade: 30
Names of students with mode as their grade: ALI
```

TASK NO.3

```
#include <bits/stdc++.h>
using namespace std;
class Triangle {
private:
   double s1;
   double s2;
   double s3;

public:
   // initializing the sides of the triangle
   Triangle(double s1, double s2, double s3) : s1(s1), s2(s2), s3(s3) {
   }

   // Function to calculate the perimeter of triangle
   double calculatePerimeter() const {
      return s1 + s2 + s3;
   }

   // Function to calculate the area of the triangle
   double calculateArea() const {
      // Calculating semi-perimeter
      double s = calculatePerimeter() / 2.0;

      // Calculate area using Hero's formula
      return sqrt(s * (s - s1) * (s - s2) * (s - s3));
   }

   // Function to print the area and perimeter of the triangle
   void printDetails() const {
      cout << "Triangle with sides: " << s1 << " m, " << s2 << " m, " << s3 << " m" << endl;
      cout << "Perimeter: " << calculatePerimeter() << " m" << endl;
      cout << "Area: " << calculateArea() << " square meters" << endl;
   }
};
int main() {
   // Create a Triangle object with sides 3 m, 4 m, and 5 m
   Triangle myTriangle(3.0, 4.0, 5.0);

   // Print the details of the triangle (area and perimeter)
   myTriangle.printDetails();

   return 0;   }
```

```
Triangle with sides: 3 m, 4 m, 5 m
Perimeter: 12 m
Area: 6 square meters
```

TASK NO.4

```
#include <bits/stdc++.h>
using namespace std;
// Define a structure to store employee information
struct Employee {
   string name;
   double salary;
   int hoursWorked;
};

// Function to increase the salary based on hours worked per day
void increaseSalary(Employee& employee) {
   if (employee.hoursWorked >= 12) {
      employee.salary += 150.0;
   } else if (employee.hoursWorked >= 10) {
      employee.salary += 100.0;
   } else if (employee.hoursWorked >= 8) {
      employee.salary += 50.0;
   }
}

int main() {
   const int numEmployees = 10;

   // Create an array of Employee structures
   Employee employees[numEmployees];

   // Input information for each employee
   for (int i = 0; i < numEmployees; ++i) {
   cout << "Enter name of employee " << i + 1 << ": ";
         cin >> employees[i].name;

   cout << "Enter salary of employee " << i + 1 << ": $";
   cin >> employees[i].salary;

   cout << "Enter hours of work per day for employee " << i + 1 << ": ";
   cin >> employees[i].hoursWorked;

      // Increase the salary based on hours worked
      increaseSalary(employees[i]);
   }
```

```
    // Print the names of all employees along with their final salaries
    cout << "\nEmployee Details:\n";
    for (int i = 0; i < numEmployees; ++i) {
        cout << "Name: " << employees[i].name << "\n";
    cout << "Final Salary: $" << employees[i].salary << "\n\n";
    }

    return 0;
}
```

```
Enter name of employee 1: AMIR
Enter salary of employee 1: $
20
Enter hours of work per day for employee 1: 23
Enter name of employee 2: USMAN
Enter salary of employee 2: $24
Enter hours of work per day for employee 2: 25
Enter name of employee 3: MUBBASHIR
Enter salary of employee 3: $50
Enter hours of work per day for employee 3: 14
Enter name of employee 4: ASEES
Enter salary of employee 4: $36
Enter hours of work per day for employee 4: 6
Enter name of employee 5: FRASAT
Enter salary of employee 5: $43
Enter hours of work per day for employee 5: 12
Enter name of employee 6: REHMAT
Enter salary of employee 6: $14
Enter hours of work per day for employee 6: 7
Enter name of employee 7: AHMAD
Enter salary of employee 7: $34
Enter hours of work per day for employee 7: 13
Enter name of employee 8: ALI
Enter salary of employee 8: $28
Enter hours of work per day for employee 8: 4
Enter name of employee 9: AREEB
Enter salary of employee 9: $6
Enter hours of work per day for employee 9: 15
Enter name of employee 10: TAHA
Enter salary of employee 10: $19
Enter hours of work per day for employee 10: 2
```

```
Employee Details:
Name: AMIR
Final Salary: $170

Name: USMAN
Final Salary: $174

Name: MUBBASHIR
Final Salary: $200

Name: ASEES
Final Salary: $36

Name: FRASAT
Final Salary: $193

Name: REHMAT
Final Salary: $14

Name: AHMAD
Final Salary: $184

Name: ALI
Final Salary: $28

Name: AREEB
Final Salary: $156

Name: TAHA
Final Salary: $19
```