

Fundamentals of Programming

Lab Task: 10

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Task:1

Code:

```
#include<bits/stdc++.h>
using namespace std;

int main() {

    vector<int> myVector;
    for (int i = 1; i <= 10; ++i) {
        myVector.push_back(i);
    }

    cout << "The elements in the vector are : ";
    for (auto it = myVector.begin(); it != myVector.end(); ++it) {
        cout << *it << " "; // *it is a pointer
    }
    cout << endl;

    myVector.push_back(5); // already defined function of push back in standard library.

    if (myVector.size() > 5) {
        myVector.erase(myVector.begin() + 5);
    }

    cout << "Vector element after pushing 5 and removing the element at position 5 : ";
    for (const auto& element : myVector) {
        cout << element << " ";
    }
    cout << endl;

    return 0;
}
```

Output:

```
The elements in the vector are : 1 2 3 4 5 6 7 8 9 10
Vector element after pushing 5 and removing the element at position 5 : 1 2 3 4 5 7 8 9 10 5
```

Task: 2

Code:

```
#include<bits/stdc++.h>
using namespace std;

double calculate_mean(const vector<int>& grades) {
    int sum = 0;
    for (int grade : grades) {
        sum += grade;
    }
    return static_cast<double>(sum) / grades.size();
}

double calculate_median(const vector<int>& grades) {
    vector<int> sortedGrades = grades;
    sort(sortedGrades.begin(), sortedGrades.end());

    size_t size = sortedGrades.size();
    if (size % 2 == 0) {
        return (sortedGrades[size / 2 - 1] + sortedGrades[size / 2]) / 2.0;
    } else {
        return sortedGrades[size / 2];
    }
}

vector<int> calculate_mode(const vector<int>& grades) {
    map<int, int> gradeCount;
    for (int grade : grades) {
        gradeCount[grade]++;
    }

    int maxFrequency = 0;
    for (const auto& pair : gradeCount) {
        maxFrequency = max(maxFrequency, pair.second);
    }

    vector<int> modeGrades;
    for (const auto& pair : gradeCount) {
        if (pair.second == maxFrequency) {
            modeGrades.push_back(pair.first);
        }
    }

    return modeGrades;
}

int main() {

    vector<string> names;
    vector<int> grades;

    int numPairs;
```

```

cout << "Enter the number of name/grade pairs: ";
cin >> numPairs;

for (int i = 0; i < numPairs; ++i) {
    string name;
    int grade;

    cout << "Enter name " << i + 1 << " : ";
    cin >> name;

    cout << "Enter grade " << i + 1 << " : ";
    cin >> grade;

    names.push_back(name);
    grades.push_back(grade);
}

double mean = calculate_mean(grades);
cout << "The Mean of grades is : " << mean << std::endl;

double median = calculate_median(grades);
cout << "The Median of grades is : " << median << std::endl;

vector<int> modeGrades = calculate_mode(grades);

cout << "The Mode of grades is : ";
for (int mode : modeGrades) {
    cout << mode << " ";
}
cout << endl;

cout << "The names a/c to their grades: ";
for (size_t i = 0; i < grades.size(); ++i) {
    if (find(modeGrades.begin(), modeGrades.end(), grades[i]) != modeGrades.end()) {
        cout << names[i] << " ";
    }
}
cout << std::endl;

return 0;
}

```

Output:

```

Enter name 2 : fahad
Enter grade 2 : 6
Enter name 3 : manan
Enter grade 3 : 8
Enter name 4 : subhan
Enter grade 4 : 4
Enter name 5 : kazmi
Enter grade 5 : 6
The Mean of grades is : 6.4
The Median of grades is : 6
The Mode of grades is : 6 8
The names a/c to their grades: haseeb fahad manan kazmi

```

