

SCHOOL OF MECHANICAL & MANUFACTURING ENGINERRING

NUST

Department of Mechanical Engineering

CS-114 – Fundamentals of Programming

LAB MANUAL #09

**Course Instructor**: Dr Khawaja Fahd Iqbal

**Lab Instructor**: Muhammad Affan

**Student Name**: Muhammad Usman Abdullah

**Section**: B

**CMS ID**: 461513

**DATE**: 27-December-2023

LAB #10 (LAB TASK)

TASK 1:

Iterate Through Vector Using Iterators and print all pushed elements. Next you need to push integer 5 and remove element at that position.

CODE:

#include <iostream>

#include <bits/stdc++.h>

#include <vector>

using namespace std;

int main(){

vector<int> it;

for (int i=1; i<=10; i++)

it.push\_back(i);

for (auto i=it.begin(); i != it.end(); ++i)

cout<<\*i<<" ";

cout<<endl;

it.push\_back(5);

cout<<"After Pushing: "<<endl;

for (auto i=it.begin(); i != it.end(); ++i)

cout<<\*i<<" ";

cout<<endl;

it.erase(it.cbegin()+4);

cout<<"After Removing: "<<endl;

for (auto i=it.begin(); i != it.end(); ++i)

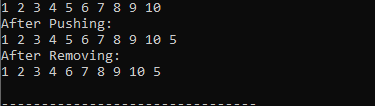
cout<<\*i<<" ";

cout<<endl;

return 0;

}

OUTPUT:



TASK 2:

Write a complete C++ program that uses 2 vectors, 1 for names (string) and 1 for grades (int)

a. Ask the user for the number of name/grade pairs that will be entered.

b. Display the mean of the grades.

c. Display the median of the grades.

d. Display the mode of the grades.

e. Display the names of the students with the mode as their grade.

CODE:

#include <iostream>

#include <bits/stdc++.h>

#include <vector>

using namespace std;

double calculateMean(const std::vector<int>& grades) {

double sum = 0;

for (int grade : grades) {

sum += grade;

}

return sum / grades.size();

}

double calculateMedian(std::vector<int>& grades) {

size\_t size = grades.size();

sort(grades.begin(), grades.end());

if (size % 2 == 0) {

return (grades[size / 2 - 1] + grades[size / 2]) / 2.0;

} else {

return grades[size / 2];

}

}

int calculateMode(const std::vector<int>& grades) {

vector<int> modes;

int currentMode = grades[0];

int currentModeCount = 1;

int maxModeCount = 1;

for (size\_t i = 1; i < grades.size(); i++) {

if (grades[i] == currentMode) {

currentModeCount++;

} else {

if (currentModeCount > maxModeCount) {

modes.clear();

modes.push\_back(currentMode);

maxModeCount = currentModeCount;

} else if (currentModeCount == maxModeCount) {

modes.push\_back(currentMode);

}

currentMode = grades[i];

currentModeCount = 1;

}

}

if (currentModeCount > maxModeCount) {

modes.clear();

modes.push\_back(currentMode);

} else if (currentModeCount == maxModeCount) {

modes.push\_back(currentMode);

}

return modes[0];

}

void displayStudentsWithMode(const std::vector<std::string>& names, const std::vector<int>& grades, int mode) {

for (size\_t i = 0; i < names.size(); i++) {

if (grades[i] == mode) {

cout << names[i] << std::endl;

}

}

}

int main() {

int numPairs;

cout << "Enter the number of entries: ";

cin >> numPairs;

vector<std::string> names(numPairs);

vector<int> grades(numPairs);

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

cout << "Enter the name of student " << i + 1 << ": ";

cin >> names[i];

cout << "Enter the grade of student " << i + 1 << ": ";

cin >> grades[i];

}

double mean = calculateMean(grades);

double median = calculateMedian(grades);

int mode = calculateMode(grades);

cout << "Mean of the grades: " << mean << std::endl;

cout << "Median of the grades: " << median << std::endl;

cout << "Mode of the grades: " << mode << std::endl;

cout<< "Names of the students with the mode as their grade: " << std::endl;

displayStudentsWithMode(names, grades, mode);

return 0;

}

OUTPUT:

