Question 09 : Problem Statement: Implement a simplified e-commerce cart system. You need to write functions to add an item to the cart, calculate the total cost of items in the cart including a fixed tax rate, and remove an item from the cart. Assume each item is represented by a struct containing a name, price, and quantity.

Sol : #include <iostream>

#include <vector>

#include <string>

#include <algorithm>

using namespace std;

struct Item {

string name;

double price;

int quantity;

};

class Cart {

private:

vector<Item> items;

double taxRate;

public:

Cart(double tax) : taxRate(tax) {}

void addItem(const Item& item) {

items.push\_back(item);

}

double calculateTotalCost() {

double total = 0.0;

for (const auto& item : items) {

total += item.price \* item.quantity;

}

return total \* (1 + taxRate);

}

void removeItem(const string& itemName) {

items.erase(remove\_if(items.begin(), items.end(), [&itemName](const Item& item) {

return item.name == itemName;

}), items.end());

}

};

int main() {

Cart cart(0.1);

Item item1, item2;

cout << "Enter the name, price, and quantity for item 1: ";

cin >> item1.name >> item1.price >> item1.quantity;

cout << "Enter the name, price, and quantity for item 2: ";

cin >> item2.name >> item2.price >> item2.quantity;

cart.addItem(item1);

cart.addItem(item2);

cout << "Total cost including tax: " << cart.calculateTotalCost() << endl;

string itemToRemove;

cout << "Enter the name of the item to remove: ";

cin >> itemToRemove;

cart.removeItem(itemToRemove);

cout << "Total cost including tax after removing an item: " << cart.calculateTotalCost() << endl;

return 0;

}

O/P : Enter the name, price, and quantity for item 1: cola 40 2

Enter the name, price, and quantity for item 2: sprite 40 3

Total cost including tax: 220

Enter the name of the item to remove: cola

Total cost including tax after removing an item: 132

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Process exited after 16.05 seconds with return value 0

Press any key to continue . .

Question-10 : Problem Statement: Develop a set of functions as part of a matrix operations library. Include functions for creating a matrix, adding two matrices, multiplying a matrix by a scalar, and displaying a matrix. Assume matrices are represented by vectors of vectors.

Sol : #include <iostream>

#include <vector>

using namespace std;

typedef vector<vector<int>> Matrix;

Matrix create\_matrix(int rows, int cols) {

return Matrix(rows, vector<int>(cols, 0));

}

Matrix add\_matrices(const Matrix& A, const Matrix& B) {

int rows = A.size();

int cols = A[0].size();

Matrix result = create\_matrix(rows, cols);

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

for (int j = 0; j < cols; ++j) {

result[i][j] = A[i][j] + B[i][j];

}

}

return result;

}

Matrix scalar\_multiply(const Matrix& A, int scalar) {

int rows = A.size();

int cols = A[0].size();

Matrix result = create\_matrix(rows, cols);

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

for (int j = 0; j < cols; ++j) {

result[i][j] = A[i][j] \* scalar;

}

}

return result;

}

void display\_matrix(const Matrix& A) {

int rows = A.size();

int cols = A[0].size();

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

for (int j = 0; j < cols; ++j) {

cout << A[i][j] << " ";

}

cout << endl;

}

}

int main() {

Matrix A = { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} };

Matrix B = { {9, 8, 7}, {6, 5, 4}, {3, 2, 1} };

cout << "Matrix A:" << endl;

display\_matrix(A);

cout << "Matrix B:" << endl;

display\_matrix(B);

Matrix sum = add\_matrices(A, B);

cout << "Sum of A and B:" << endl;

display\_matrix(sum);

Matrix scaled\_A = scalar\_multiply(A, 2);

cout << "Scaled matrix A by 2:" << endl;

display\_matrix(scaled\_A);

return 0;

}

O/P : Matrix A:

1 2 3

4 5 6

7 8 9

Matrix B:

9 8 7

6 5 4

3 2 1

Sum of A and B:

10 10 10

10 10 10

10 10 10

Scaled matrix A by 2:

2 4 6

8 10 12

14 16 18

Question-11 :

(1) Write a c++ program to create a class for a bank account with a constructor and a destructor

Sol : #include <iostream>

#include <string>

class BankAccount {

private:

std::string accountNumber;

double balance;

public:

BankAccount(const std::string& accNumber, double initialBalance) : accountNumber(accNumber), balance(initialBalance) {

std::cout << "Bank account created\n";

}

~BankAccount() {

std::cout << "Bank account destroyed\n";

}

};

int main() {

BankAccount account("123456789", 1000.0);

return 0;

}

O/P : Bank account created

Bank account destroyed

(12) : Write a c++ program to create a class for a car with a constructor and a destructor

Sol : #include <iostream>

#include <string>

class Car {

private:

std::string make;

std::string model;

int year;

public:

Car(const std::string& carMake, const std::string& carModel, int carYear) : make(carMake), model(carModel), year(carYear) {

std::cout << "Car object created\n";

}

~Car() {

std::cout << "Car object destroyed\n";

}

void display() const {

std::cout << "Make: " << make << ", Model: " << model << ", Year: " << year << std::endl;

}

};

int main() {

Car myCar("Toyota", "Corolla", 2020);

myCar.display();

return 0;

}

O/P : Car object created

Make: Toyota, Model: Corolla, Year: 2020

Car object destroyed

(13) : Write a c++ program to create a class for a rectangle with a constructor and a destructor

Sol : #include <iostream>

class Rectangle {

private:

double length;

double width;

public:

Rectangle(double l, double w) : length(l), width(w) {

std::cout << "Rectangle object created\n";

}

~Rectangle() {

std::cout << "Rectangle object destroyed\n";

}

double area() const {

return length \* width;

}

double perimeter() const {

return 2 \* (length + width);

}

};

int main() {

Rectangle myRect(5.0, 3.0);

std::cout << "Area: " << myRect.area() << std::endl;

std::cout << "Perimeter: " << myRect.perimeter() << std::endl;

return 0;

}

O/P : Rectangle object created

Area: 15

Perimeter: 16

Rectangle object destroyed