Name: Esha Eman Sagheer

SAP ID: 52925

DSA LAB 11

Task 1:

#include <iostream>

using namespace std;

int factorial(int x) {

if (x == 0 || x == 1) {

return 1;

}

return x \* factorial(x - 1);

}

int main() {

int n;

cout << "Enter a non-negative integer: ";

cin >> n;

if (n < 0) {

cout << "Factorial is not defined for negative numbers"<<endl;

} else {

int result = factorial(n);

cout <<"Factorial of "<<n<<" is "<<result<<endl;

}

return 0;

}

Task 2:

#include <iostream>

using namespace std;

int binarySearch(const int arr[], int left, int right, int target) {

if (left > right) {

return -1;

}

int mid = left + (right - left) / 2;

if (arr[mid] == target) {

return mid;

}

if (target < arr[mid]) {

return binarySearch(arr, left, mid - 1, target);

}

return binarySearch(arr, mid + 1, right, target);

}

int main() {

const int arr[] = {10, 20, 30, 40, 50, 60, 70, 80, 90, 100};

int size = sizeof(arr) / sizeof(arr[0]);

int target;

cout << "Enter the number to search: ";

cin >> target;

int result = binarySearch(arr, 0, size - 1, target);

if (result != -1) {

cout << "Element found at index: " << result << endl;

} else {

cout << "Element not found in the array." << endl;

}

return 0;

}

Task 3:

#include <iostream>

using namespace std;

int linearSearch(const int arr[], int size, int target, int index = 0) {

if (index >= size) {

return -1;

}

if (arr[index] == target) {

return index;

}

return linearSearch(arr, size, target, index + 1);

}

int main() {

const int arr[] = {1, 2, 3, 4, 5, 6, 7};

int size = sizeof(arr) / sizeof(arr[0]);

int target;

cout << "Enter the number to search: ";

cin >> target;

int result = linearSearch(arr, size, target);

if (result != -1) {

cout << "Element found at index: " << result << endl;

} else {

cout << "Element not found in the array." <<endl;

}

return 0;

}

Task 4:

#include <iostream>

using namespace std;

int main() {

const string tickets[10] = {

"10000", "20000", "30000", "40000", "50000",

"60000", "70000", "80000", "90000", "99992"

};

string winningNumber;

bool isWinner = false;

cout << "Enter this week's winning 5-digit number: ";

cin >> winningNumber;

for (int i = 0; i < 10; ++i) {

if (tickets[i] == winningNumber) {

isWinner = true;

break;

}

}

if (isWinner) {

cout << "Congratulations! You have a winning ticket: " << winningNumber << endl;

} else {

cout << "Sorry the number " << winningNumber << " is invalid " << endl;

}

return 0;

}

Task 5:

#include <iostream>

using namespace std;

int sumArray(const int arr[], int size, int index = 0) {

if (index >= size) {

return 0;

}

return arr[index] + sumArray(arr, size, index + 1);

}

int main() {

const int arr[] = {1, 2, 3, 4, 5};

int size = sizeof(arr) / sizeof(arr[0]);

int totalSum = sumArray(arr, size);

cout << "The sum of the array elements is: " << totalSum << endl;

return 0;

}