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Section: SE 3-2

Data Structures lab

Lab # 03 Tasks:-

Tasks

Program 01:

```
#include<iostream>
using namespace std;

int main()
{
    int searchValue;
    cout<<"Enter the value you want to search : ";
    cin>>searchValue;
    bool found = false;

    int numbers[10]={1,2,3,4,5,6,7,8,9,10};
```

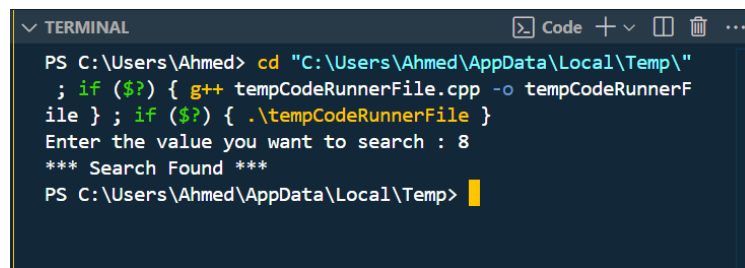
```

    for (int i = 0; i < 10; i++)
    {
        if (numbers[i]==searchValue)
        {
            found=true;
            cout<<"*** Search Found ***"<<endl;
            break;
        }
    }
    if(found==false)
        cout<<"*** Search Not Found ***"<<endl;

    return 0;
}

```

Output:



```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile } ; if ($?) { .\tempCodeRunnerFile }
Enter the value you want to search : 8
*** Search Found ***
PS C:\Users\Ahmed\AppData\Local\Temp>

```

Program 02:

```

#include <iostream>
using namespace std;
int main()
{
    int array[5] = {1, 2, 3, 4, 5};
    int num, index;
    cout << "Enter the index do you want replace number " << endl;
    cin >> index;
    cout << "Enter the number " << endl;
    cin >> num;
    bool replace = false;
    for (int i = 0; i < 5; i++)
    {
        if (index == i)
        {
            array[i - 1] = num;
            cout << "Number succesfully replaced in given index " << endl;

```

```

        replace = true;
        break;
    }
}
if (replace == false)
{
    cout << "Element not updated " << endl;
}
cout << "The updated array is " << endl;
for (int i = 0; i < 5; i++)
{
    cout << array[i] << endl;
}
return 0;
}

```

Output:

```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile } ; if ($?) { .\tempCodeRunnerFile }
Enter the index do you want replace number
4
Enter the number
7
Number succesfully replaced in given index
The updated array is
1
2
3
7
5
PS C:\Users\Ahmed\AppData\Local\Temp>

```

Program 03:

```

#include<iostream>
using namespace std;

int main()
{
    int n=5;
    int array[5]={1,2,3,4,5};

    int ele;
    cout<<"Enter the Element you want to Delete : ";
    cin>>ele;

    for (int i = ele; i < n-1; i++)
    {
        array[i]=array[i+1];
    }
}

```

```

    }

    cout<<"After Deletion : "<<endl;
    for (int i = 0; i < n-1; i++)
    {
        cout<<array[i]<<" "<<endl;
    }

    return 0;
}

```

Output:



```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile } ; if ($?) { .\tempCodeRunnerFile }
Enter the Element you want to Delete : 9
After Deletion :
1
2
3
4
PS C:\Users\Ahmed\AppData\Local\Temp>

```

Program 04:

```

#include <iostream>
using namespace std;

bool isPalindrome(int arr[], int size)
{
    for (int i = 0; i < size / 2; i++)
    {
        if (arr[i] != arr[size - 1 - i])
        {
            return false;
        }
    }
}

```

```

    }
}
return true;
}
int main()
{
    const int size = 6;
    int array[size];

    cout << "Enter 6 integers: " << endl;
    for (int i = 0; i < size; ++i)
    {
        cin >> array[i];
    }
    if (isPalindrome(array, size))
    {
        cout << "The array represents a palindrome." << endl;
    }
    else
    {
        cout << "The array does not represent a palindrome." << endl;
    }

    return 0;
}

```

Output:



```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile } ; if ($?) { .\tempCodeRunnerFile }
Enter 6 integers:
1
2
3
4
5
6
The array does not represent a palindrome.
PS C:\Users\Ahmed\AppData\Local\Temp>

```

Program 05:

```

#include <iostream>
#include <vector>

using namespace std;

```

```

// Function to calculate factorial
int factorial(int n) {
    int fact = 1;
    for (int i = 1; i <= n; ++i) {
        fact *= i;
    }
    return fact;
}

int main() {
    int size;
    cout << "Enter the size of the array (1-20): ";
    cin >> size;

    if (size < 1 || size > 20) {
        cout << "Invalid size. Please enter a number between 1 and 20." << endl;
        return 1;
    }

    vector<int> array(size);
    int sum = 0;

    // Taking input and calculating sum
    cout << "Enter " << size << " integers (0-12): " << endl;
    for (int i = 0; i < size; ++i) {
        cin >> array[i];
        if (array[i] < 0 || array[i] > 12) {
            cout << "Invalid input. Please enter a number between 0 and 12." << endl;
            return 1;
        }
        sum += array[i];
    }

    // Calculating and displaying average
    double average = static_cast<double>(sum) / size;
    cout << "Average of elements: " << average << endl;

    // Displaying factorials
    cout << "Factorials of elements: " << endl;
    for (int i = 0; i < size; ++i) {
        cout << array[i] << "! = " << factorial(array[i]) << endl;
    }

    return 0;
}

```

```
}
```

Output:

```
PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile }; if ($?) { .\tempCodeRunnerFile }
Enter the size of the array (1-20): 5
Enter 5 integers (0-12):
2
3
4
5
6
Average of elements: 4
Factorials of elements:
2! = 2
3! = 6
4! = 24
5! = 120
6! = 720
PS C:\Users\Ahmed\AppData\Local\Temp>
```

Program 06:

```
#include <iostream>
#include <vector>

using namespace std;

int main() {
    int size, key;
    cout << "Enter the size of the array: ";
    cin >> size;

    if (size < 1) {
        cout << "Invalid size. The array size should be at least 1." << endl;
        return 1;
    }

    vector<int> array(size);

    // Taking input for array elements
    cout << "Enter " << size << " integers: " << endl;
    for (int i = 0; i < size; ++i) {
        cin >> array[i];
    }

    // Taking input for key to search
    cout << "Enter the key to search for: ";
    cin >> key;

    // Linear search
    bool found = false;
    for (int i = 0; i < size; ++i) {
        if (array[i] == key) {
```

```

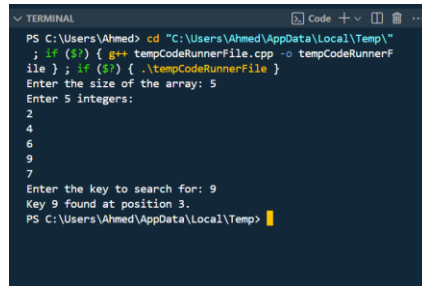
        cout << "Key " << key << " found at position " << i << "." << endl;
        found = true;
        break;
    }
}

if (!found) {
    cout << "Key " << key << " not found in the array." << endl;
}

return 0;
}

```

Output:



```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile }; if ($?) { .\tempCodeRunnerFile }
Enter the size of the array: 5
Enter 5 integers:
2
4
6
9
7
Enter the key to search for: 9
Key 9 found at position 3.
PS C:\Users\Ahmed\AppData\Local\Temp>

```

Program 07:

```

#include <iostream>

using namespace std;

int main() {
    const int SIZE = 4;
    int matrix[SIZE][SIZE];
    int key;
    bool found = false;

    // Input the 4x4 matrix
    cout << "Enter the elements of a 4x4 matrix:" << endl;
    for (int i = 0; i < SIZE; ++i) {
        for (int j = 0; j < SIZE; ++j) {
            cin >> matrix[i][j];
        }
    }
}

```



```

// Input the value to search for
cout << "Enter the value to search for: ";
cin >> key;

// Search the matrix for the key
for (int i = 0; i < SIZE; ++i) {
    for (int j = 0; j < SIZE; ++j) {
        if (matrix[i][j] == key) {
            cout << "Value " << key << " found at row " << i << " and column " << j << "." << endl;
            found = true;
            break;
        }
    }
    if (found) break;
}

if (!found) {
    cout << "Value " << key << " not found in the matrix." << endl;
}

return 0;
}

```

Output:



```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile } ; if ($?) { .\tempCodeRunnerFile }
Enter the elements of a 4x4 matrix:
2
3
4
5
6
7
3
5
7
8
9
0
5
7
5
65
Enter the value to search for: 9
Value 9 found at row 2 and column 2.
PS C:\Users\Ahmed\AppData\Local\Temp>

```

Program 08:

```

#include <iostream>

using namespace std;

int main() {
    const int SIZE = 3;
    int matrix[SIZE][SIZE], transpose[SIZE][SIZE];
}

```

```

// Input the 3x3 matrix
cout << "Enter the elements of a 3x3 matrix:" << endl;
for (int i = 0; i < SIZE; ++i) {
    for (int j = 0; j < SIZE; ++j) {
        cin >> matrix[i][j];
    }
}

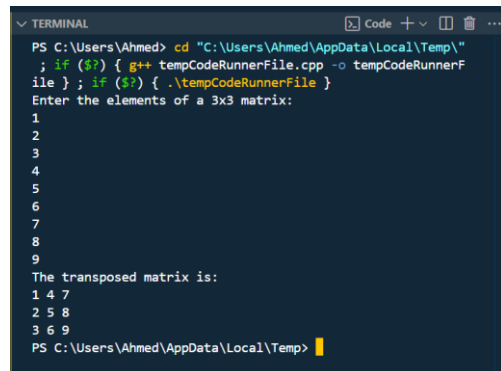
// Transpose the matrix (swap rows with columns)
for (int i = 0; i < SIZE; ++i) {
    for (int j = 0; j < SIZE; ++j) {
        transpose[j][i] = matrix[i][j];
    }
}

// Display the transposed matrix
cout << "The transposed matrix is:" << endl;
for (int i = 0; i < SIZE; ++i) {
    for (int j = 0; j < SIZE; ++j) {
        cout << transpose[i][j] << " ";
    }
    cout << endl;
}

return 0;
}

```

Output:



```

PS C:\Users\Ahmed> cd "C:\Users\Ahmed\AppData\Local\Temp\"
; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
ile }; if ($?) { .\tempCodeRunnerFile }
Enter the elements of a 3x3 matrix:
1
2
3
4
5
6
7
8
9
The transposed matrix is:
1 4 7
2 5 8
3 6 9
PS C:\Users\Ahmed\AppData\Local\Temp>

```