Aim:

Write a **C** program to find whether a given matrix is a `symmetric matrix` or not.

Hint: A **symmetric matrix** is a square matrix that is equal to its **transpose**.

At the time of execution, the program should print the message on the console as:

```
Enter the order of matrix :
```

For example, if the user gives the **input** as:

```
Enter the order of matrix : 2 2
```

Next, the program should print the message on the console as:

```
Enter 4 elements :
```

if the user gives the **input** as:

```
Enter 4 elements : 4 5 5 4
```

then the program should **print** on the console as:

```
The given matrix is
4 5
5 4
Transpose of the given matrix is
4 5
5 4
The given matrix is symmetric matrix
```

If the condition is **true**, then the program should **print** the result as :

```
The given matrix is symmetric matrix
```

Otherwise, the program should **print** the result as :

```
The given matrix is not symmetric matrix
```

Note: Do use the **printf()** function with a **newline** character (**\n**).

Source Code:

SymmetricMatrix.c

```c
#include<stdio.h>
int main()
{
    int m,n,c,d,matrix[10][10],transpose[10][10];
    printf("Enter the order of matrix : ");
    scanf("%d%d",&m,&n);
    printf("Enter %d elements : ",m*n);
    for(c=0;c<m;c++)
        for(d=0;d<n;d++)
```

```
    scanf("%d",&matrix[c][d]);
    printf("The given matrix is\n");
    for(c=0;c<m;c++)
    {
        for(d=0;d<n;d++)
        {
            printf("%d ",matrix[c][d]);
        }
        printf("\n");
    }
    for(c=0;c<m;c++)
    for(d=0;d<n;d++)
    transpose[d][c]=matrix[c][d];
    printf("Transpose of the given matrix is\n");
    for(c=0;c<n;c++)
    {
        for(d=0;d<m;d++)
        {
            printf("%d ",transpose[c][d]);
        }
        printf("\n");
    }
    if(m==n)
    {
        for(c=0;c<m;c++)
        {
            for(d=0;d<n;d++)
            {
                if(matrix[c][d]!=transpose[c][d])
                break;
            }
            if(d!=m)
            break;
        }
        if(c==m)
        printf("The given matrix is symmetric matrix\n");
        else
        printf("The given matrix is not symmetric matrix\n");
    }
    else
    printf("The given matrix is not symmetric matrix\n");
    return 0;
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the order of matrix : 2 2
Enter 4 elements : 1 2 3 4
The given matrix is
1 2
3 4
Transpose of the given matrix is

1 3
2 4
The given matrix is not symmetric matrix

Test Case - 2

User Output
Enter the order of matrix : 2 2
Enter 4 elements : 4 5 5 4
The given matrix is
4 5
5 4
Transpose of the given matrix is
4 5
5 4
The given matrix is symmetric matrix

Test Case - 3

User Output
Enter the order of matrix : 3 2
Enter 6 elements : 1 2 3 4 5 6
The given matrix is
1 2
3 4
5 6
Transpose of the given matrix is
1 3 5
2 4 6
The given matrix is not symmetric matrix

Test Case - 4

User Output
Enter the order of matrix : 3 3
Enter 9 elements : 1 1 1 1 1 1 1 1 1
The given matrix is
1 1 1
1 1 1
1 1 1
Transpose of the given matrix is
1 1 1
1 1 1
1 1 1
The given matrix is symmetric matrix