

SOURCE CODE FOR MAGIC SQUARE – SUBMITTED BY 38880164

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#include <stdio.h>
#include <stdlib.h>

// A program to check if a user inputted Matrix is Magic square or not
int main()
{
    // Initialising the values for the Variables
    int magicSquare[100][100]; //2D array "magicSquare"
    int i; // Index of the rows
    int j; // Index of the columns
    int ROW; // Number of rows
    int COL; // Number of columns
    int sum_rows[10]; // Sum of rows
    int sum_cols[10]; // Sum of columns
    int *p,*q,m,n;
    int d1=0; // Primary diagonal (Top left - Bottom right)
    int d2=0; // Secondary diagonal (Top right - Bottom left)
    int num,x=0,b[100];

    // Entering the number of rows and columns in a matrix to check if it is a Square Matrix or not
    printf("Enter grid size \n");
    scanf("%d %d",&m,&n);

    // Assigning the value of m and n as row and column respectively using pointers
    p=&ROW;
    q=&COL;
    *p=m;
    *q=n;
    if (ROW!=COL)
    {
        printf("This is not a square matrix. Try Again!");
        exit(0);
    }

    //Inputting elements into the 2D array
    printf("\n Enter elements of the matrix to check if it is a Magic Square: \n");
    for(i=0;i<ROW;i++)
    {
        for(j=0;j<COL;j++)
        {
            scanf("%d",&magicSquare[i][j]);
        }
    }
}
```

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    }
}

//Making a duplicate 1D array
for(i=0;i<ROW;i++)
{
    for(j=0;j<COL;j++)
    {
        b[x++]=magicSquare[i][j];
    }
}

//Checking if the inputted elements are distinct or not
for (num=0;num<x-1;num++)
{
    for (j=num+1;j<x;j++)
    if (b[num]==b[j]){
        printf("Elements are not distinct\n");
        printf("Matrix is not magic");
        exit(0);
    }
}

//Comparing the two diagonals
for(i=0;i<ROW;i++)
{
    d1=d1+magicSquare[i][i];
    d2=d2+magicSquare[i][ROW-i-1];
}

//Checking if the sum of elements in rows is equal to sum of elements in primary diagonal
for(i=0;i<ROW;i++)
{
    sum_rows[i]=0;
    for(j=0;j<COL;j++)
    {
        sum_rows[i]=sum_rows[i]+magicSquare[i][j];
    }
    if (sum_rows[i]!=d1)
    {

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printf("The sum of elements in the row is not equal to the sum of elements in the
Primary diagonal. \n");
printf("Here is an example of an auto generated Magic Square grid!\n");
int last_ele = ROW*COL;
int i = 0;
int j = m / 2;
int num; // Number of elements from 1 to m**2
for (num = 1; num <= last_ele; ++num)

{
    magicSquare[i][j] = num;
    i--;
    j++;
    if (num % m == 0)
    {
        i += 2;
        --j;

    }
    else
    {
        if(j==m)
        {
            j-=m;

        }
        else if (i < 0)
        {
            i += m;

        }
    }
}

for (i = 0; i < m; i++)
{
    for (j = 0; j < m; j++)
    {
        printf("%d ", magicSquare[i][j]);
    }
    printf("\n");
}
printf("\n");

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        exit(0);
    }
}
//Checking if the sum of elements in columns is equal to sum of elements in primary
diagonal
for(i=0;i<COL;i++)
{
    sum_cols[i]=0;
    for(j=0;j<ROW;j++)
    {
        sum_cols[i]=sum_cols[i]+magicSquare[j][i];
    }
    if (sum_cols[i]!=d1)
    {
        printf("The sum of elements in the column is not equal to the sum of elements in the
Primary diagonal");
        exit(0);
    }
}

printf("Matrix is Magic\n");
for (i=0;i<ROW;i++)
{
    for(j=0;j<COL;j++)
    {
        printf("%d\t",magicSquare[i][j]);
    }
    printf("\n");
}

return 0;
}
```

CASE 1 : The grid size does not form a Square Matrix

Enter grid size

3

4

This is not a square matrix. Try Again!

CASE 2 : The elements entered are not distinct.

Enter grid size

3

3

Enter elements of the matrix to check if it is a Magic Square:

1

3

5

4

5

7

8

3

2

1

Elements are not distinct

Matrix is not magic

### CASE 3 : The matrix is not a Magic Square

Enter grid size

3

3

Enter elements of the matrix to check if it is a Magic Square:

1

2

3

4

5

6

7

8

9

The sum of elements in the row is not equal to the sum of elements in the Primary diagonal.

Here is an example of an auto generated Magic Square grid!

8 1 6

3 5 7

4 9 2



### CASE 4 : The matrix is a Magic Square

Enter grid size

3

3

Enter elements of the matrix to check if it is a Magic Square:

8

1

6

3

5

7

4

9

2

Matrix is Magic

8 1 6

3 5 7

4 9 2

