



MAGIC SQUARE

**Check if the entered
matrix is magic square of
not..**

**And generate magic
squares**

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Develop a C++ program which determines if a square matrix is a magic square.

A magic square is an $n \times n$ (i.e, square) matrix of numbers containing all numbers from 1 to n^2 such that all the numbers in any given row, column, or main diagonal sum to the same number. The number n is called the order of the magic square.

Task is to write a program that reads the order of a magic square, and then reads n^2 additional numbers (in row major order) into a two-dimensional $n \times n$ array. Your program will then test the square and report whether or not it is a magic square.

Also write another program to create magic squares for odd numbers

Code for checking if the entered square matrix is magic square or not

```
#include<iostream>

#include<conio.h>

using namespace std;

int main()
{
    int size;

    cout<<"\n\t===== \n\n";

    cout<<"\t\t\tMAGIC SQUARE\n";

    cout<<"\t===== \n\n";

    cout<<"\tEnter size of Magic Square : \t";
```

```
cin>>size;

int arr[size][size];

int i,j,c1,c2;

int check[2*size];

for(i=0;i<2*size;i++)

check[i]=0;


cout<<"\n\t\tNo element should repeat\n\n";

for(i=0;i<size;i++)

{

    for(j=0;j<size;j++)

    {

        xyz:

        cout<<"\tEnter Element ["<i<<"]["<j<<"] : ";

        cin>>arr[i][j];

        for(c1=0;c1<i;c1++)

        for(c2=0;c2<size;c2++)

        if(arr[i][j]==arr[c1][c2])

            goto xyz;

        for(c1=0;c1<j;c1++)

            if(arr[i][c1]==arr[i][j])
```

```
        goto xyz;

    }

}

for(c1=0,i=0;i<size;i++,c1++)
{
    for(j=0;j<size;j++)
    {
        check[c1]+=arr[i][j];
        check[c1+size]+=arr[j][i];
    }
}

c2=check[0];

for(c1=1;c1<(2*size)-1;c1++)
{
    if(c2!=check[c1])
    {
        cout<<"\n\tSquare is not magic square \n\n";

        cout<<"\n\tYOU ENTERED FOLLOWING SQUARE \n\n";

        for(i=0;i<size;i++)
```

```
{

cout<<"\t\n\t";

for(j=0;j<size;j++)

{

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

}

}

getch();

cout<<endl;

    return 0;

}

}

cout<<"\n\tYeah... you won... You entered a perfect Magic Square \n\n";

    cout<<"\n\tYOU ENTERED FOLLOWING SQUARE \n\n";

for(i=0;i<size;i++)

{

    cout<<"\t\n\t";

    for(j=0;j<size;j++)

    {

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

    }

}
```

```
    }

    cout<<"\n\n\tSum of its each row and column is same = "<<check[0];

    getch();

    return 0;

}
```

```
=====
MAGIC SQUARE
=====
Enter size of Magic Square( Must be ODD ) :    3
      No element should repeat

Enter Element [0][0] : 1
Enter Element [0][1] : 2
Enter Element [0][2] : 3
Enter Element [1][0] : 4
Enter Element [1][1] : 5
Enter Element [1][2] : 6
Enter Element [2][0] : 9
Enter Element [2][1] : 8
Enter Element [2][2] : 7

Square is not magic square

YOU ENTERED FOLLOWING SQUARE

1  2  3
4  5  6
9  8  7
```

```
=====
MAGIC SQUARE
=====

Enter size of Magic Square( Must be ODD ) :    3

    No element should repeat

Enter Element [0][0] : 3
Enter Element [0][1] : 5
Enter Element [0][2] : 7
Enter Element [1][0] : 8
Enter Element [1][1] : 1
Enter Element [1][2] : 6
Enter Element [2][0] : 4
Enter Element [2][1] : 9
Enter Element [2][2] : 2

Yeah... you won... You entered a perfect Magic Square

YOU ENTERED FOLLOWING SQUARE

3  5  7
8  1  6
4  9  2

Sum of its each row and column is same = 15
```

Code for generating magic squares

```
#include<iostream>

#include<conio.h>

using namespace std;

int main()
{
    cout<<"\n\t=====\\n\\n";

    cout<<"\t\t\tGENERATE MAGIC SQUARES\\n";

    cout<<"\t\t=====\\n\\n";

    int n;

    do
```

```
{  
  
    cout<<"\n\tEnter a number to find its Magic square:\n";  
  
    cout<<"\n\t(Number Must be odd) \t";  
  
    cin>>n;  
  
}  
  
while(n%2==0);  
  
int m[n][n];  
  
int i,j;  
  
for(i=0;i<n;i++)  
  
    for(j=0;j<n;j++)  
  
        m[i][j]=0;  
  
i = n/2;  
  
j = n-1;  
  
//assign values  
for (int num=1; num <= n*n; )  
{  
    if (i==n-1 && j==0)  
    {  
        j = n-2;  
  
        i = 0;  
    }  
}
```



```
else

{

    if (j == n)

        j = 0;

    if (i < 0)

        i=n-1;

}

if (m[i][j]!=0)

{

    j -= 2;

    i++;

    continue;

}

else

    m[i][j] = num++;

j++; i--;

}

// Print magic square
```

```
cout<<"\n\tMAGIC SQUARE OF "<<n<<" x "<<n<<"\n\twith sum of each row and column  
= "<<n*(n*n+1)/2<<" is \n\n";
```

```
for (i=0; i<n; i++)
```

```
{
```

```
cout<<"\t";
```

```
for (j=0; j<n; j++)
```

```
cout<<m[i][j]<<"\t";
```

```
cout<<endl;
```

```
}
```

```
cout<<endl;
```

```
getch();
```

```
return 0;
```

```
}
```

```
=====
                        GENERATE MAGIC SQUAREs
=====

Enter a number to find its Magic square:
(Number Must be odd)      5

MAGIC SQUARE OF 5 x 5
with sum of each row and column = 65 is

  9      3      22     16     15
  2      21     20     14      8
 25      19     13      7      1
 18      12      6       5     24
 11      10      4      23     17

-----
Press exited after 4.624 seconds with return value 0
Press any key to continue . . .
```

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