What is Symmetric Matrix?
- A Square Matrix is said to be symmetric if it is equal to its transpose.
- Transpose of a matrix is achieved by exchanging indices of rows and columns.
- Transpose is only defined for a square matrix.

Example 1: Program to check Matrix is a Symmetric Matrix or Not.
```c
#include<stdio.h>
#include<conio.h>

void main()
{
    int r, c, a[3][3], b[3][3], count=1;
    clrscr();
    printf("\n Please Enter the Matrix Elements \n");
    for(r=0; r<3; r++)
        for(c=0; c<3; c++)
            scanf("%d", &a[r][c]);
    for(r=0; r<3; r++)
        for(c=0; c<3; c++)
            b[c][r] = a[r][c];
    for(r=0; r<3; r++)
        for(c=0; c<3; c++)
            if(a[r][c]!=b[r][c])
            {
                count++;
                break;
            }
    if(count == 1)
        printf("\n Matrix is a Symmetric Matrix ");
    else
        printf("\n Matrix not a Symmetric Matrix ");
    getch();
}
```

Another method without using transpose the matrix.
```c
#include<stdio.h>
#include<conio.h>

void main()
{
    int r, c, a[3][3];
    clrscr();
    printf("\n Please Enter the Matrix Elements \n");
    for(r=0; r<3; r++)
        for(c=0; c<3; c++)
            scanf("%d", &a[r][c]);
    for(r=0; r<3; r++)
        for(c=0; c<3; c++)
            if(a[r][c]!=a[c][r])
```

What is Sparse Matrix?
➢ Sparse matrix is a matrix with the majority of its elements equal to zero.
➢ Sparse matrix has more zero elements than nonzero elements

Example 2: Program to check Matrix is a Sparse Matrix or Not.

```c
#include <stdio.h>
#include <conio.h>
void main ()
{
    int r,c,a[3][3],count=0;
    clrscr();
    printf("Please Enter the Matrix Elements \n");
    for (r=0; r<3; r++)
    for (c=0; c<3;c++)
        scanf("%d", &a[r][c]);

    for (r=0; r<3; r++)
    for (c=0; c<3;c++)
        if (a[r][c]==0)
            count++;

    if (count > ((r*c)/2))
        printf("The given matrix is sparse matrix ");
    else
        printf("The given matrix is not a sparse matrix ");

    printf("There are %d number of zeros", count);
    getch();
}
```

The `exit()` function is used to terminate the program/process normally and returns the status code to the parent program/process.

Counting the number of element is zero