Course Name: O Level (2nd Sem B2 and B3 Batch) **Subject:** C Language
Topic: Problems on Matrix **Date:** 18-May-2020

What is Symmetric Matrix?

- A Square Matrix is said to be symmetric if it is equal to it's **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.

```
#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();
}
```

Transpose of Matrix

Another method without using transpose the matrix.

```
#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])
```

```
{
    printf("\n Matrix is not a Symmetric Matrix ");
    getch();
    exit(0);
  }
printf("\n Matrix a Symmetric Matrix ");
getch();
}
```

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

What is Sparse Matrix?

- Sparse matrix is a matrix with the majority of its elements equal to zero.
- Sparse martix has more zero elements than nonzero elements

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

```
#include <stdio.h>
#include <conio.h>
void main ()
{
   int r,c,a[3][3],count=0;
   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]==0)
    count++;

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

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

Counting the number of element is zero