

Lab Test 2

1. Create a folder (directory) **LABS2** in your home directory. Move to the directory **LABS2**.
2. Create a data file **mat.dat** that contains the row and column dimensions in the first line and the matrix components row wise in the following lines. Use the following for **mat.dat**

2 3

1.5 -2.5 -2.5

1.05 2.25 -1.0

3. Skeleton of a C program file **lab2.c** is sent to your email. You download the file to **LABS2** and rename it **roll.c** where **roll** is your roll number. The program calculates Frobenius norm of a matrix **A** and its transpose using a function **calTF**. The Frobenius norm, $\|\mathbf{A}\|_F$, of a real $m \times n$ matrix **A** is defined by $\|\mathbf{A}\|_F = \sqrt{\sum_{i=1}^m \sum_{j=1}^n a_{ij}^2}$. The transpose of the matrix **A** is stored in a dynamic 2-D array like variable **B**. Do not use extra array or array like variables. You need to modify the code (see the comments). Remove the comment parts in your program.

(1) Write the prototype of the function **calTF**

(2) Read m, n and matrix entries from **mat.dat**

(3) Print the matrix row wise

(4) Create dynamic array like variable **B** that will store transpose of **A**

(5) Call the function **calTF**. After call to the function, **fnorm** contains the Frobenius norm of **A** and **B** refers to the transpose of **A**

(6) Write the details of the function **calTF**

```
4. #include <stdio.h>
#include <math.h>
#include <stdlib.h>
#define N 10
// (1)
int main( )
{
    int m,n,i,j;           // m & n are actual row and column dimensions of A
    double A[N][N],**B;
    double fnorm;
    FILE *fp;
    //(2)
    printf("The given matrix A is:\n");
    //(3)
    //(4)
    //(5)
    printf("Frobenius norm of A=%0.2e\n",fnorm);
    printf("The transpose of matrix A is:\n");
    for(i=0;i<n;i++)
    {
        for(j=0;j<m;j++)
            printf("%0.2lf  ",B[i][j]);
```

```
        printf("\n");  
    }  
    return 0;  
}  
//(6)
```

Expected output:

The given matrix A is:

1.50 -2.50 -2.50

1.05 2.25 -1.00

Frobenius norm of A=4.68e+00

The transpose of matrix A is:

1.50 1.05

-2.50 2.25

-2.50 -1.00