

LAB VIII

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2. #include <stdio.h>
#include <stdlib.h>
#define N 100
void matread(int *,int *,double [][] [N],char *);
void matprintt(char,int ,int ,double [][] [N]);
void matprintf(int ,int ,double [][] [N],char *);
int matmul(int,int,int,int,int*,int*,double [][] [N],double [][] [N],double [][] [N]);

int main()
{
    int rowA,colA,rowB,colB,rowC,colC,flag;
    double A[N] [N] ,B[N] [N] ,C[N] [N];

    matread(&rowA,&colA,A,"amatA.dat"); //read matrix A
    matprintt('A',rowA,colA,A); //print matrix A in the terminal
    matread(&rowB,&colB,B,"amatB.dat"); //read matrix B
    matprintt('B',rowB,colB,B); //print matrix B in the terminal
    flag=matmul(rowA,colA,rowB,colB,&rowC,&colC,A,B,C); //C=AB
    if(flag==0)
    {
        printf("Matrices A and B are incompatiable for multiplication\n");
    }
    else
    {
        matprintt('C',rowC,colC,C); //print matrix C in the terminal
        matprintf(rowC,colC,C,"matC.dat"); //print matrix C in the file "matC.dat"
    }
    return 0;
}

int matmul(int m,int n,int p,int q,int *row,int *col,
           double A[] [N],double B[] [N],double C[] [N])
{
    int i,j,k;
    if(n !=p)
    {
        return 0;
    }

    *row=m;
    *col=q;
    for(i=0;i<m;i++)
    {
        for(j=0;j<q;j++)
        {
            C[i] [j]=0.0;
            for(k=0;k<n;k++)
            {
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        C[i][j] +=A[i][k]*B[k][j];
    }
}

return 1;
}

void matprintt(char mat,int m,int n,double A[][N])
{
int i,j;
printf("The matrix %c is:\n",mat);

for(i=0;i<m;i++)
    { for(j=0;j<n;j++)
        printf("%0.2lf ",A[i][j]);
        printf("\n");
    }

}

void matprintf(int m,int n,double A[][N],char *fname)
{
int i,j;
FILE *fp;

fp=fopen(fname,"w");
if(fp==NULL)
    {
        printf("Error in creating %s\n",fname);
        exit(1);
    }

fprintf(fp,"%d %d\n",m,n);

for(i=0;i<m;i++)
    {
        for(j=0;j<n;j++)
            {
                fprintf(fp,"%0.2lf ",A[i][j]);
            }
        fprintf(fp,"\n");
    }

}

void matread(int *row,int *col,double A[][N],char *filename)
{
int m,n,i,j;

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FILE *fp;
fp=fopen(filename,"r");
if(fp==NULL)
{
    printf("Error in opening %s\n",filename);
    exit(1);
}

fscanf(fp,"%d%d",&m,&n);
if(m<1 || n<1)
{
    printf("Row & col dims must be +ve\n");
    exit(1);
}

if(m>N || n>N)
{
    printf("Increase the size of N\n");
    exit(1);
}

*row=m;
*col=n;
for(i=0;i<m;i++)
{
    for(j=0;j<n;j++)
    {
        fscanf(fp,"%lf",&A[i][j]);
    }
}
}

```