Εργαστήριο 4

Να γράψετε ένα πρόγραμμα το οποίο θα υπολογίζει την ορίζουσα ενός πίνακα χρησιμοποιώντας τη ρουτίνα τριγωνοποίησης που κατασκευάσατε για τη μέθοδο απαλοιφής Gauss

Λύση σε C

```
//Erg4-Askhsh eksetashs

//Ypologismos orizousas

//Partial pivoting has been maintained in the calculation of determinant


#include <stdlib.h>

#include <stdio.h>

#include <math.h>

#define EPS 1.e-5

#define ZERO 1.e-10

#define NMAX 30




double det(double a[][NMAX], int N)

{

        int i,j,i1,j_d,imax, s, pwr;

        double dummy,mult, MAX, ans;

        double a_d[NMAX][NMAX];

        //dummy array, so as not to change matrix a[i][j]

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

```
{
        for(j=0;j<N;j++)
                a_d[i][j] = a[i][j];
}



s=0;
for (i=0;i<N;i++)
{
        //do pivoting
        MAX = fabs(a_d[i][i]);
        imax = i;
        for (i1=i+1;i1<N;i1++)
        {
                if ( fabs(a_d[i1][i]) > MAX )
                {
                        MAX = fabs(a_d[i1][i]);
                        imax = i1;
                }
        }

        //do the change-over
        if(fabs( MAX-fabs(a_d[i][i]) ) > EPS  )
        {
                for (j_d=0;j_d<N; j_d++)
                {
                        dummy = a_d[imax][j_d];
```

```
                    a_d[imax][j_d]  = a_d[i][j_d];
                    a_d[i][j_d] = dummy;
                }
                s++; //counter for determinant
            }

            //now do the triangulation for every line

            for(i1=i+1;i1<N;i1++)
            {
                mult = a_d[i1][i]/a_d[i][i];
                for(j = i;j<N;j++)
                {
                    a_d[i1][j] = a_d[i1][j] - mult* a_d[i][j];
                    if (fabs(a_d[i1][j]) < ZERO) a_d[i1][j]=0.0;
                }
            }

}//end

//Now calculate derivative from multiplication of diagonal
ans =1.0;
for (i=0;i<N;i++)    ans = ans*a_d[i][i];
pwr = 1;
for (i=1;i<=s;i++) pwr *= (-1);

ans = ans*pwr;
```

```
	return ans;
}


int main(void)
{
	double a[NMAX][NMAX];
	int i, j, N;

	FILE *dat;

	if ( (dat=fopen("test.dat", "r"))==NULL) exit(1);



	fscanf(dat,"%d", &N);   //diavase diastash pinaka

	//diavase stoixeia pinaka
	for(i=0;i<N;i++)
	{
		for(j=0;j<N;j++)
		{
			fscanf(dat,"%lf", &a[i][j]);
		}
	}
```

```
        printf("H orizoysa toy pinaka A einai %10.5f\n", det(a, N) );


        return 0;
}
```