**PROGRAM:**

#include<iostream>

using namespace std;

int a[100][100],b[100][100],i,j,k,sum[100][100],s[100][100],product[100][100],addA=0,addB=0,g=0,h=0,p=0,q=0,n,o;

int accept()

{

cout<<"\nenter matrix a elements\n";

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

cin>>a[i][j];

}

}

cout<<"\nenter matrix b elements\n";

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

cin>>b[i][j];

}

}

}

int display()

{

cout<<"the entered matrix A is ";

for(i=0;i<n;i++)

{

cout<<endl;

for(j=0;j<o;j++)

{

cout<<a[i][j]<<"\t";

}

}

cout<<endl;

cout<<"the entered matrix B is ";

for(i=0;i<n;i++)

{ cout<<endl;

for(j=0;j<o;j++)

{

cout<<b[i][j]<<"\t";

}

}

}

int add()

{

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

sum[i][j]=0;

}

}

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

sum[i][j]=a[i][j]+b[i][j];

}

}

cout<<endl<<"the addition matrix is"<<endl;

for(i=0;i<n;i++)

{

cout<<endl;

for(j=0;j<o;j++)

{

cout<<sum[i][j]<<"\t";

}

cout<<"\t";

}

}

int sub()

{

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

s[i][j]=0;

}

}

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

s[i][j]=a[i][j]-b[i][j];

}

}

cout<<endl;

cout<<"the subtraction matrix is"<<endl;

for(i=0;i<n;i++)

{

cout<<endl;

for(j=0;j<o;j++)

{

cout<<s[i][j]<<"\t";

}

cout<<"\t";

}

}

int multiply()

{

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

product[i][j]=0;

for(k=0;k<n;k++)

{

product[i][j]=product[i][j]+(a[i][k]\*b[k][j]);

}

}

}

cout<<endl<<"the product matrix is";

for(i=0;i<n;i++)

{

cout<<endl;

for(j=0;j<n;j++)

{

cout<<product[i][j]<<"\t";

}

cout<<"\t";

}

}

int diag()

{

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

if(i==j)

addA=addA+a[i][j];

}

}

cout<<endl<<"the sum of diagonal elements of matrix A is "<<addA;

for(i=0;i<n;i++)

{

for(j=0;j<o;j++)

{

if(i==j)

addB=addB+b[i][j];

}

}

cout<<endl<<"the sum of diagonal elements of matrix A is "<<addB;

}

int transpose()

{

cout<<endl<<"the transpose of entered matrix A is ";

for(i=0;i<o;i++)

{

cout<<endl;

for(j=0;j<n;j++)

{

cout<<a[j][i]<<"\t";

}

}

cout<<endl;

cout<<endl<<"the transpose of entered matrix B is ";

for(i=0;i<o;i++)

{ cout<<endl;

for(j=0;j<n;j++)

{

cout<<b[j][i]<<"\t";

}

}

}

int uppert()

{

int flag=0;

for(int i=0;i<n;i++)

{

for(int j=0;j<o;j++)

{

if(i>j&&a[i][j]!=0)

{

flag=1;

break;

}

}

}

if(flag==1)

cout<<"\nmatrix a is not an upper triangular matrix ";

else

cout<<"\nmatrix a is an upper triangular matrix ";

int flag1=-1;

for(int i=0;i<n;i++)

{

for(int j=0;j<o;j++)

{

if(i>j&&b[i][j]!=0)

{

flag1=1;

break;

}

}

}

if(flag1==1)

cout<<"\nmatrix b is not an upper triangular matrix ";

else

cout<<"\nmatrix b is an upper triangular matrix ";

}

int main()

{

char ans;

cout<<"\nenter no. of rows\n";

cin>>n;

cout<<"\nenter no.of columns equal to number of rows\n";

cin>>o;

accept();

do

{

display();

int num;

cout<<endl<<"press 1 to add";

cout<<endl<<"press 2 to subtract ";

cout<<endl<<"press 3 to multiply";

cout<<endl<<"press 4 to add diagonal elements ";

cout<<endl<<"press 5 to display transpose ";

cout<<endl<<"press 6 to display upper triangular or not ";

cout<<"\npress 7 to do everything\n";

cin>>num;

switch(num)

{

case 1: add();

break;

case 2: sub();

break;

case 3: multiply();

break;

case 4: diag();

break;

case 5: transpose();

break;

case 6: uppert();

break;

case 7:add();

sub();

multiply();

diag();

transpose();

uppert();

break;

default:cout<<"try again";

}

cout<<"\ndo you want to continue?(y/n)\n";

cin>>ans;

}

while(ans=='y' || ans=='Y');

return 0;

}

**OUTPUT:**

enter no. of rows

3

enter no.of columns equal to number of rows

3

enter matrix a elements

1 2 3 9 8 0 6 5 4

enter matrix b elements

1 2 6 5 3 4 8 1 9

the entered matrix A is

1 2 3

9 8 0

6 5 4

the entered matrix B is

1 2 6

5 3 4

8 1 9

press 1 to add

press 2 to subtract

press 3 to multiply

press 4 to add diagonal elements

press 5 to display transpose

press 6 to display upper triangular or not

press 7 to do everything

7

the addition matrix is

2 4 9

14 11 4

14 6 13

the subtraction matrix is

0 0 -3

4 5 -4

-2 4 -5

the product matrix is

35 11 41

49 42 86

63 31 92

the sum of diagonal elements of matrix A is 13

the sum of diagonal elements of matrix A is 13

the transpose of entered matrix A is

1 9 6

2 8 5

3 0 4

the transpose of entered matrix B is

1 5 8

2 3 1

6 4 9

matrix a is not an upper triangular matrix

matrix b is not an upper triangular matrix

do you want to continue?(y/n)

n