#include<stdio.h>

#include<conio.h>

#include<graphics.h>

#include<math.h>

#define pi 3.14

int p1[3][3]={0,0,0,0,0,0,0,0,0};

int p[3][3]={0,0,0,0,0,0,1,1,1};

void translate(int p[3][3],int,int);

void scaling(int p[3][3],int,int);

void rotate(int p[3][3],double);

void main()

{

int gd,gm,x1,x2,y1,y2,i,j,choice;

int tx,ty,sx,sy;

double theta;

clrscr();

detectgraph(&gd,&gm);

initgraph(&gd,&gm,"c:\\tc\\bgi");

printf("Enter the co-ordinates of the line\n");

printf("Values of x1 and y1\n");

scanf("%d%d",&p[0][0],&p[1][0]);

printf("Values of x2 and y2\n");

scanf("%d%d",&p[0][1],&p[1][1]);

line(p[0][0],p[1][0],p[0][1],p[1][1]);

while(1)

{

printf("Enter your choice\n");

printf("1. Translation\n2. Rotation\n3. Scaling\n4. Exit\n");

scanf("%d",&choice);

switch(choice)

{

case 1:

printf("Enter value of tx and ty\n");

scanf("%d%d",&tx,&ty);

translate(p,tx,ty);

printf("%d %d %d %d",p[0][0],p[0][1],p[1][0],p[1][1]);

line(p[0][0],p[1][0],p[0][1],p[1][1]);

break;

case 2:

printf("Enter values of angle of rotation\n");

scanf("%lf",&theta);

rotate(p,theta);

line(p[0][0],p[1][0],p[0][1],p[1][1]);

break;

case 3:

printf("Enter values of scaling factors\n");

scanf("%d%d",&sx,&sy);

scaling(p,sx,sy);

line(p[0][0],p[1][0],p[0][1],p[1][1]);

break;

case 4:

exit(0);

default:

printf("You entered wrong choice\n");

}

}

}

void copy(int p1[3][3])

{

int i,j;

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

p[i][j]=p1[i][j];

}

}

}

//Scaling

void scaling(int p[3][3],int sx,int sy)

{

int i,j,k;

int s[3][3]={0,0,0,0,0,0,0,0,1};

s[0][0]=sx;

s[1][1]=sy;

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

p1[i][j]=0;

for(k=0;k<3;k++)

{

p1[i][j]+=s[i][k]\*p[k][j];

}

}

}

copy(p1);

}

//Translation

void translate(int p[3][3],int tx,int ty)

{

int i,j,k;

int t[3][3]={1,0,0,0,1,0,0,0,1};

t[0][2]=tx;

t[1][2]=ty;

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

p1[i][j]=0;

for(k=0;k<3;k++)

{

p1[i][j]+=t[i][k]\*p[k][j];

}

printf("%d\t",p1[i][j]);

}

printf("\n");

}

copy(p1);

}

//Rotation

void rotate(int p[3][3],double theta)

{

int i,j,k;

double st,ct;

double r[3][3]={0,0,0,0,0,0,0,0,1};

st=sin((theta\*pi)/180);

ct=cos((theta\*pi)/180);

r[0][0]=r[1][1]=ct;

r[0][1]=-st;

r[1][0]=st;

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

p1[i][j]=0;

for(k=0;k<3;k++)

{

p1[i][j]+=r[i][k]\*p[k][j];

}

}

}

copy(p1);

}