PROGRAM:

Code:

```
#include <stdio.h>
#include <conio.h>
#include <math.h>
#include <graphics.h>

void multiply(float[3][3], float[3]), clearMat(float[3][3]);
void translate(float[3], float, float);
void rotate(float[3], float);
void scale(float[3], float, float);
void reflectX(float[3]), reflectY(float[3]), reflect(float[3]);
void shear(float[3], float, float);
void Triangle(float[3], float[3], float[3]);
        void main() {
        float p1[3] = {0, 0, 1}, p2[3] = {0, 0, 1}, p3[3] = {0, 0, 1};
        float tx, ty, sx, sy, shx, shy, theta;
        int ch;
        int gd = DETECT, gm;
        initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");
        line(320, 0, 320, 480); //y-axis
        line(0, 240, 640, 240); //x-axis
        printf("Enter cordinates of first point of triangle\n");
        scanf("%f %f", &p1[0], &p1[1]);
        printf("Enter coordinates of second point of triangle\n");
        scanf("%f %f", &p2[0], &p2[1]);
        printf("Enter coordinates of third point of triangle\n");
        scanf("%f %f", &p3[0], &p3[1]);
```

```
        Triangle(p1, p2, p3);
        printf("Enter your choice\n1-Translate\n2-Rotate\n3-Scale\n4-Reflect\n5-
Shear\n");
        scanf("%d", &ch);
 switch(ch){
 case 1:
        printf("Enter value of translation value in x direction\n");
        scanf("%f", &tx);
        printf("Enter translation value in y direction\n");
        scanf("%f", &ty);
        translate(p1, tx, ty);
        translate(p2, tx, ty);
        translate(p3, tx, ty);
        Triangle(p1, p2, p3);
        break;
 case 2:
        printf("Enter angle of rotation in degrees\n");
        scanf("%f", &theta);
        theta *= 3.1415f/180;
        rotate(p1, theta);
        rotate(p2, theta);
        rotate(p3, theta);
        Triangle(p1, p2, p3);
        break;
 case 3:
        printf("Enter scale value in x direction\n");
        scanf("%f", &sx);
        printf("Enter scale value in y direction\n");
        scanf("%f", &sy);
```

```
        scale(p1, sx, sy);
        scale(p2, sx, sy);
        scale(p3, sx, sy);
        Triangle(p1, p2, p3);
        break;
case 4:
        printf("Reflection about what ?\n");
        printf("1 - X axis\n2- Y axis\n3 - Origin");
        scanf("%d", &ch);
        if(ch == 1){
        reflectX(p1);
        reflectX(p2);
        reflectX(p3);
        }
        else if(ch == 2){
        reflectY(p1);
        reflectY(p2);
        reflectY(p3);
        }
        else{
        reflect(p1);
        reflect(p2);
        reflect(p3);
        }
        Triangle(p1, p2, p3);
        break;
case 5:
        printf("Enter shearing value in x direction\n");
        scanf("%f", &shx);
```

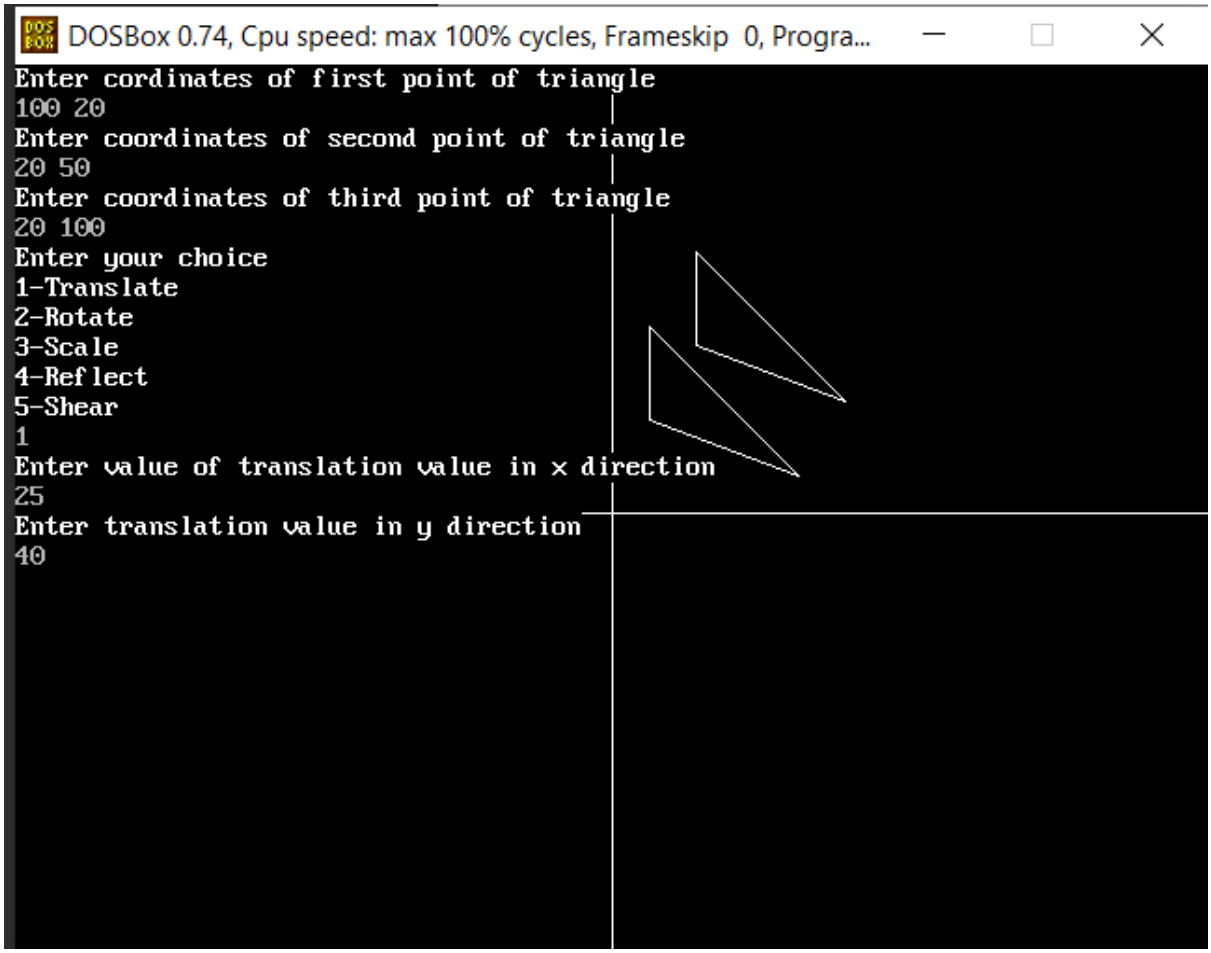
```
        printf("Enter shearing value in y direction\n");
        scanf("%f", &shy);
        shear(p1, shx, shy);
        shear(p2, shx, shy);
        shear(p3, shx, shy);
        Triangle(p1, p2, p3);
        break;
 }
 getch();
 closegraph();
}
void translate(float p[], float tx, float ty){
        int i, j;
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = 1;
 mat[1][1] = 1;
 mat[2][2] = 1;
 mat[0][2] = tx;
 mat[1][2] = ty;
 multiply(mat, p);
}
void rotate(float p[], float theta){
        int i, j;
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = cos(theta);
 mat[0][1] = -sin(theta);
 mat[1][0] = sin(theta);
```

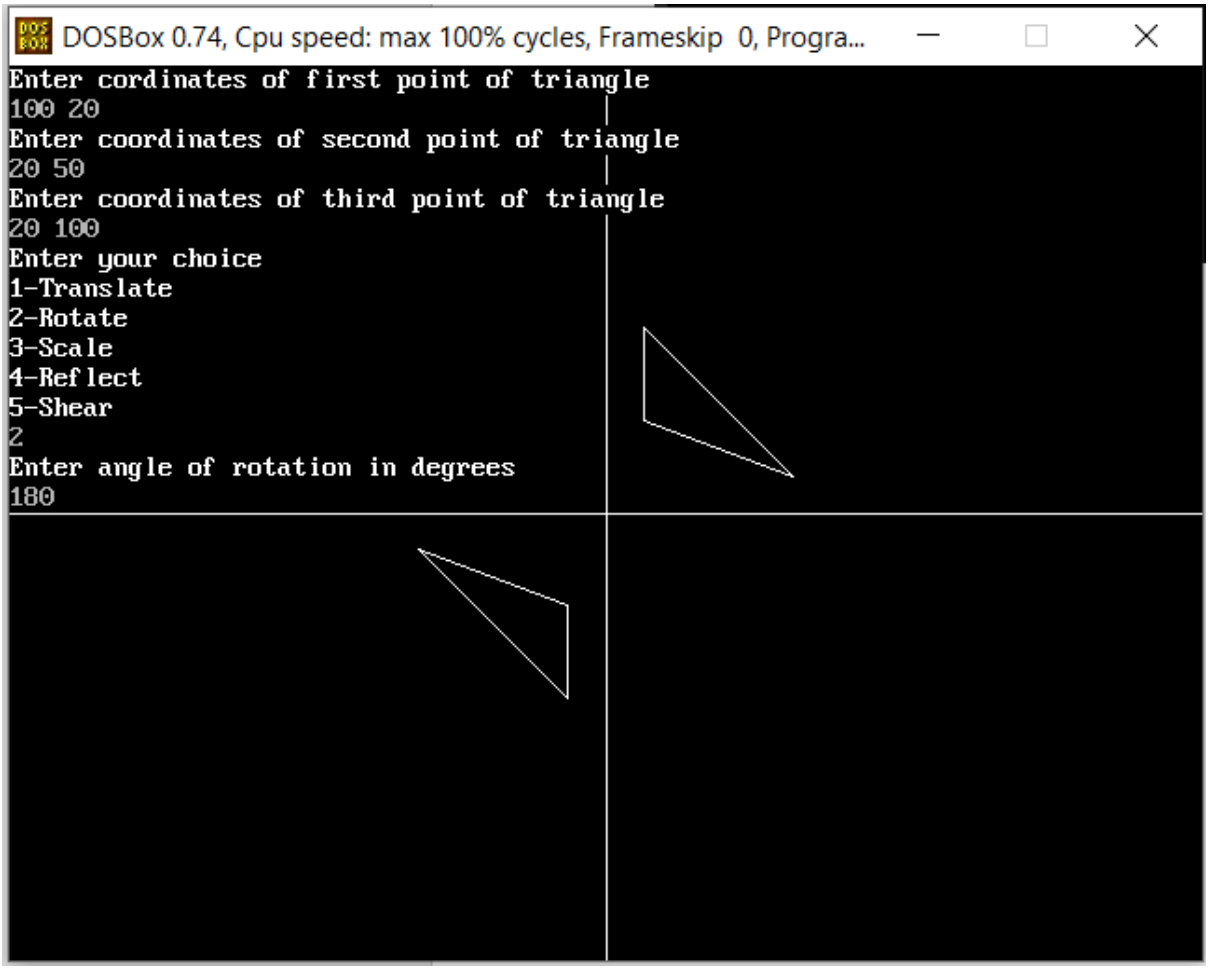
```
 mat[1][1] = cos(theta);
 mat[2][2] = 1;
 multiply(mat, p);
}
void scale(float p[3], float sx, float sy){
        int i, j;
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = sx;
 mat[1][1] = sy;
 mat[2][2] = 1;
 multiply(mat, p);
}
void reflectX(float p[3]){
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = 1;
 mat[1][1] = -1;
 mat[2][2] = 1;
 multiply(mat, p);
}
void reflectY(float p[3]){
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = -1;
 mat[1][1] = 1;
 mat[2][2] = 1;
 multiply(mat, p);
}
```

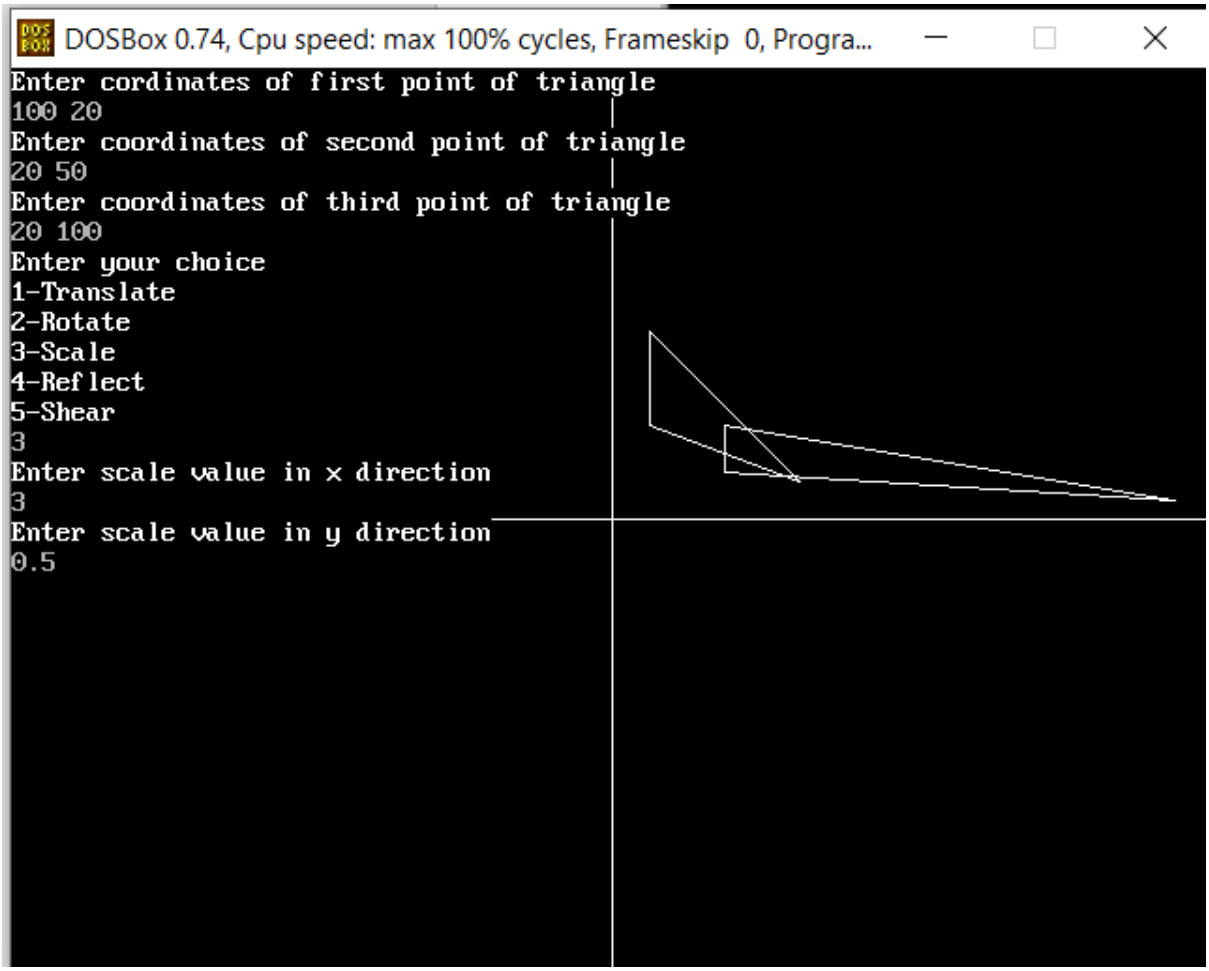
```
void reflect(float p[3]){
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = -1;
 mat[1][1] = -1;
 mat[2][2] = 1;
 multiply(mat, p);
}
void shear(float p[3], float shx, float shy){
        float mat[3][3];
        clearMat(mat);
 mat[0][0] = 1; mat[1][1] = 1; mat[2][2] = 1;
 mat[1][0] = shx;
 mat[0][1] = shy;
 multiply(mat, p);
}
void multiply(float mat[3][3], float pt[3]){
        int pt0 = pt[0], pt1 = pt[1], pt2 = pt[2];
 pt[0] = pt0*mat[0][0] + pt1*mat[0][1] + pt2*mat[0][2];
 pt[1] = pt0*mat[1][0] + pt1*mat[1][1] + pt2*mat[1][2];
 pt[2] = pt0*mat[2][0] + pt1*mat[2][1] + pt2*mat[2][2];
}
void Triangle(float p1[], float p2[], float p3[]){
 line(320+p1[0], 240-p1[1], 320+p2[0], 240-p2[1]);
 line(320+p2[0], 240-p2[1], 320+p3[0], 240-p3[1]);
 line(320+p3[0], 240-p3[1], 320+p1[0], 240-p1[1]);
}
void clearMat(float mat[3][3]){
 int i, j;
```

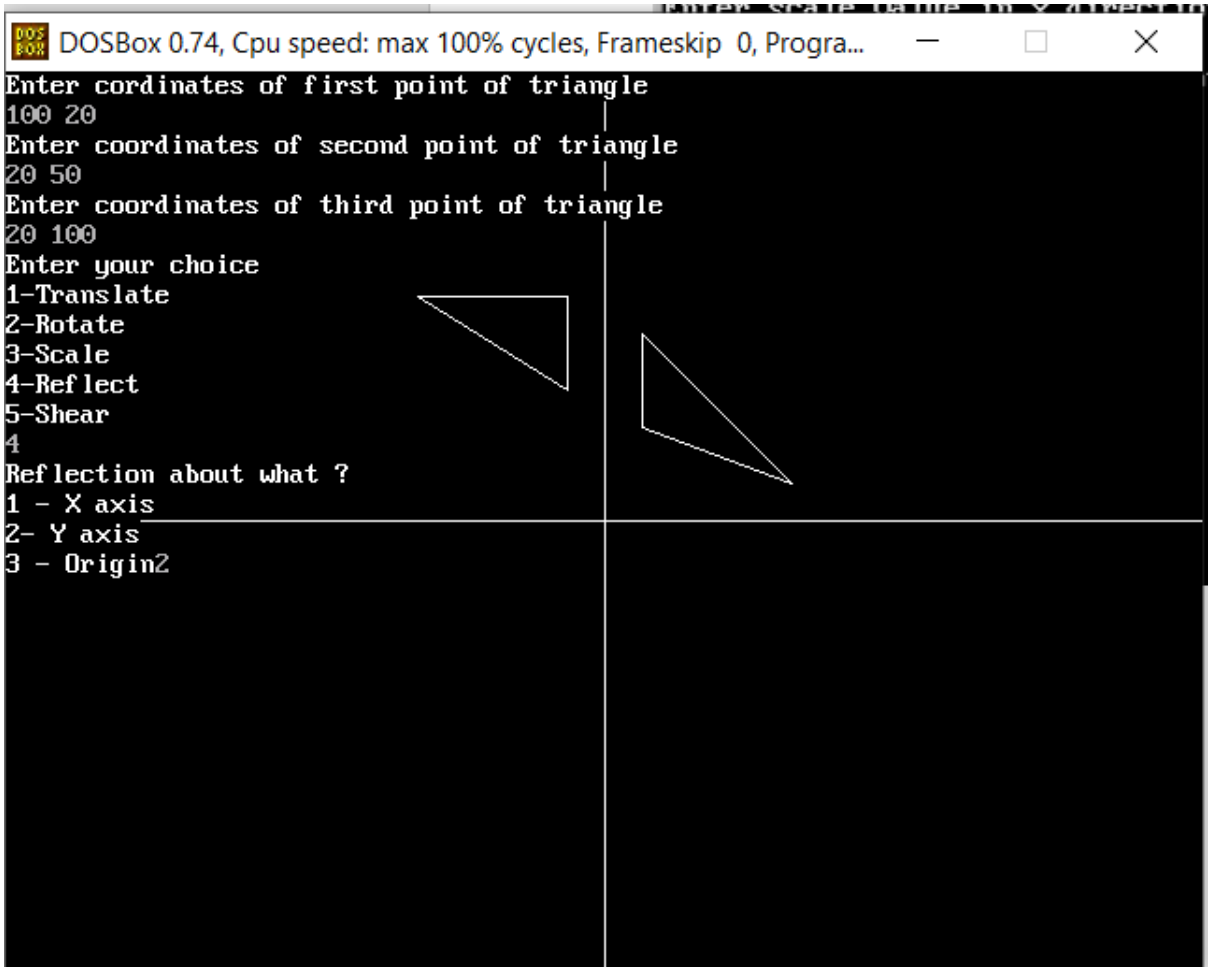
```
 for(i = 0; i < 3; i++)
        for(j = 0; j < 3; j++)
              mat[i][j] = 0;
}
```

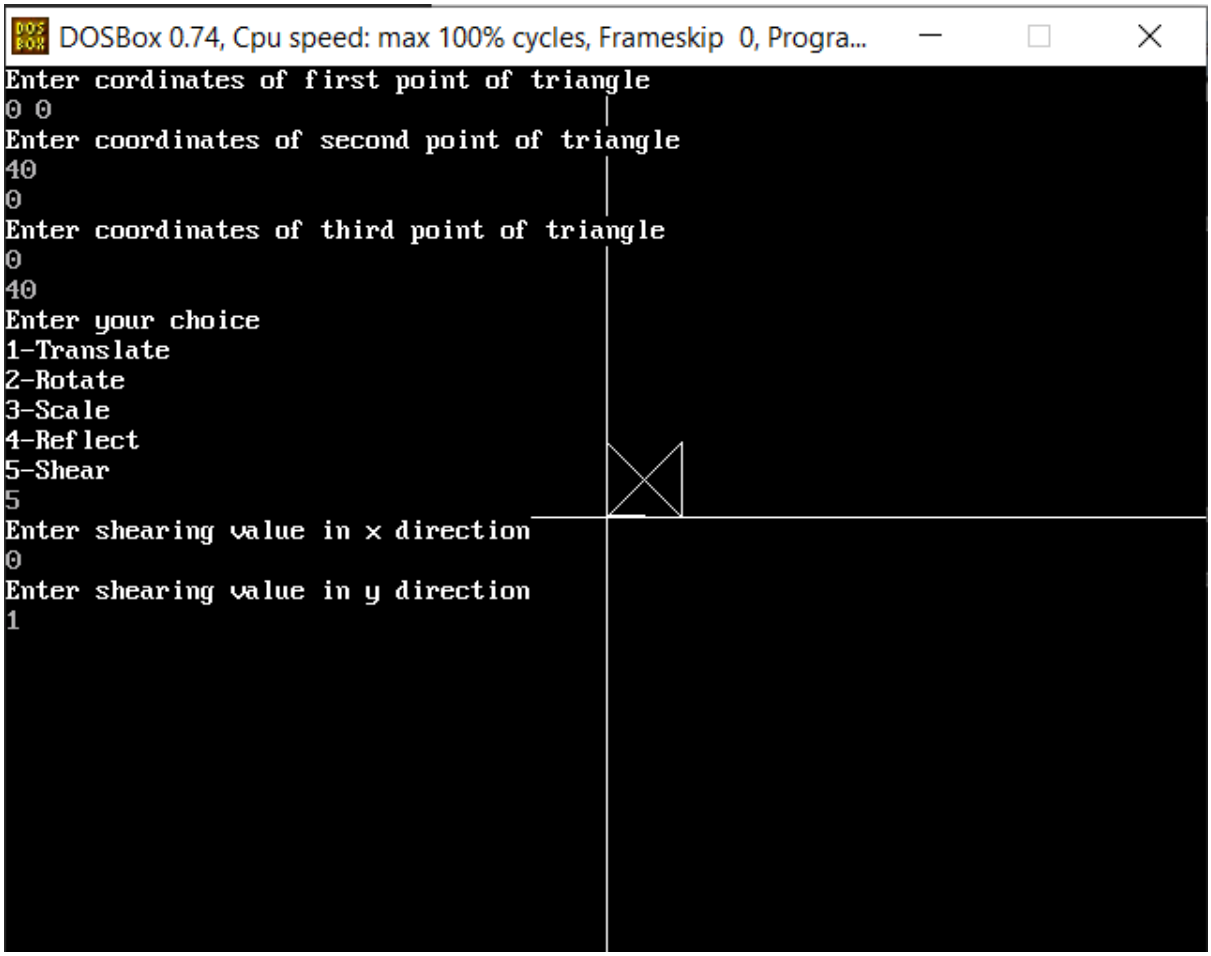
OUTPUT:




DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...
Enter cordinates of first point of triangle
100 20
Enter coordinates of second point of triangle
20 50
Enter coordinates of third point of triangle
20 100
Enter your choice
1-Translate
2-Rotate
3-Scale
4-Reflect
5-Shear
2
Enter angle of rotation in degrees
180


DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...
Enter cordinates of first point of triangle
100 20
Enter coordinates of second point of triangle
20 50
Enter coordinates of third point of triangle
20 100
Enter your choice
1-Translate
2-Rotate
3-Scale
4-Reflect
5-Shear
3
Enter scale value in x direction
3
Enter scale value in y direction
0.5


DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...
Enter cordinates of first point of triangle
100 20
Enter coordinates of second point of triangle
20 50
Enter coordinates of third point of triangle
20 100
Enter your choice
1-Translate
2-Rotate
3-Scale
4-Reflect
5-Shear
4
Reflection about what ?
1 - X axis
2- Y axis
3 - Origin2


DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...
Enter cordinates of first point of triangle
0 0
Enter coordinates of second point of triangle
40
0
Enter coordinates of third point of triangle
0
40
Enter your choice
1-Translate
2-Rotate
3-Scale
4-Reflect
5-Shear
5
Enter shearing value in x direction
0
Enter shearing value in y direction
1