

Assignment B-4Problem Statement:

Write a C++ code/Java program to implement reflection of 2-D object about X-axis, Y-axis and about X-Y axis. Also rotate object about arbitrary point by user.

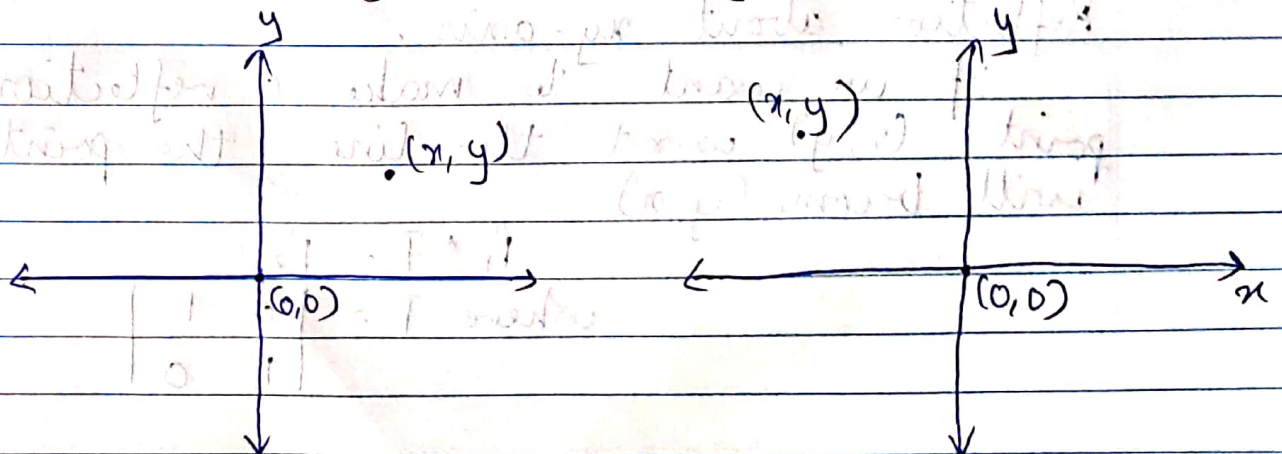
Objective:

To understand and learn 2-D transformation. To implement 2-D transformation about x-axis, y-axis and about x-y axis. To implement rotation of object about an arbitrary point.

Outcome: Implement 2-D transformation of 2-D object. Implement transformation about various axes and about one point.

Theory:

Reflection of y-axis is similar to placing mirror at y-axis and taking the mirror image of an obj.

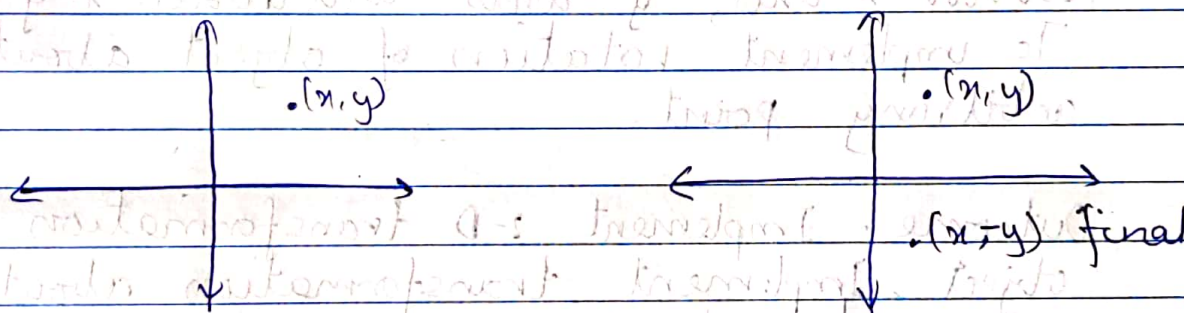


By basic transformation Rule

$$P_1 \cdot T = P_2$$

Reflection at x-axis.

It is very similar to reflection at y-axis. Here we change the sign of y . It means we are assuming mirror at x -axis.



$$P_1 \cdot T = P_2$$

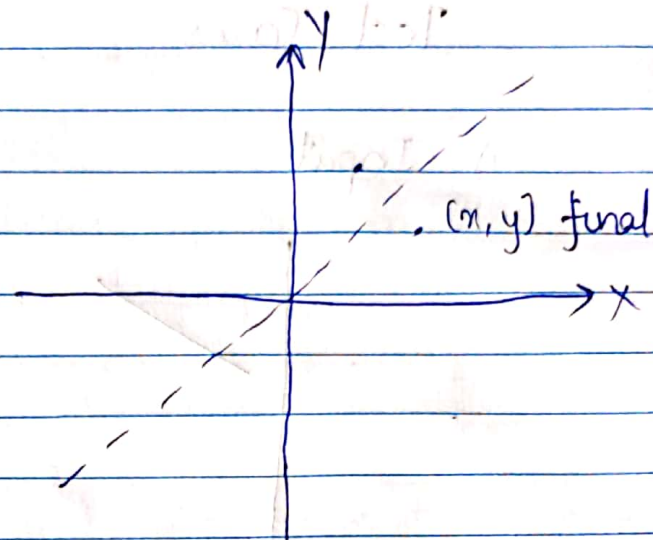
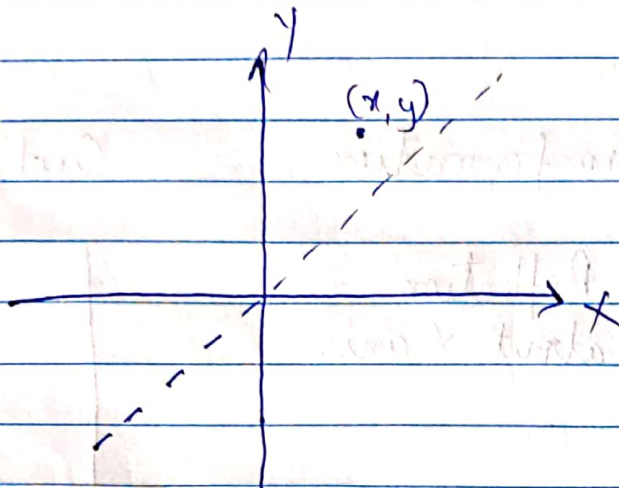
where $T = \begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix}$

Reflection about xy-axis.

If we want to make a reflection of point (x, y) w.r.t the line, the point (x, y) will become (y, x) .

$$P_1 \cdot T = P_2$$

where $T = \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix}$



Algorithm :

x axis (int x, int y) {

int mat[1][2]; ans[1][2];

mat[0][0] = x; mat[0][1] = y;

int t[2][2];

t[0][0] = 1; t[0][1] = 0;

t[1][0] = 0; t[1][1] = -1;

ans = mat * t;

putpixel(ans[0][0], ans[0][1])

}

y axis (int x, int y) {

int mat[1][2]; ans[1][2];

mat[0][0] = x; mat[0][1] = y;

int t[2][2];

t[0][0] = -1; t[0][1] = 0;

t[1][0] = 0; t[1][1] = 1;

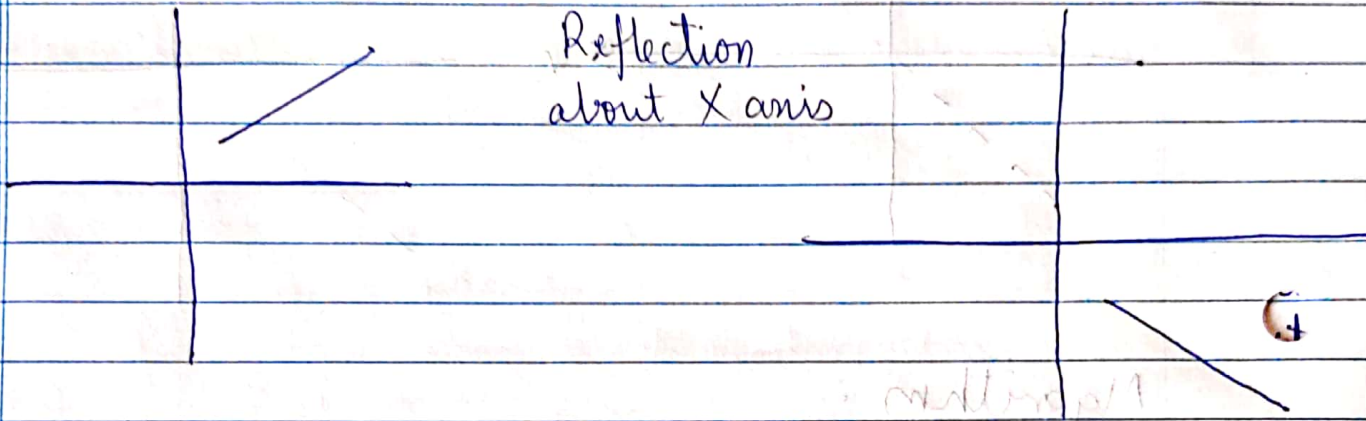
ans = mat * t;

putpixel(ans[0][0], ans[0][1]);

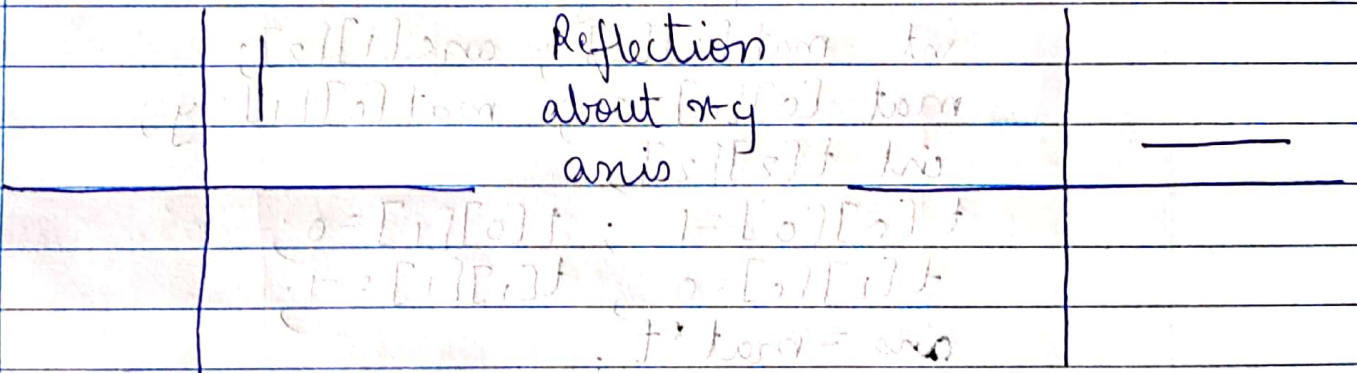
}

Test Cases

1) Input Transformation Output



2) Reflection about xy axis



Conclusion: Thus the given 2-D transformations were implemented on 2-D figures.