

Assignment 16. BQ

DATE:

Problem Statement: Write C++ program to implement reflection of 2D object about x & y & any axis. Also rotate object about arbitrary point given by user.

Learning objective: To understand mathematical concepts behind implementation of 2D transformations, and to implement 2D reflection using matrix multiplication in C++.

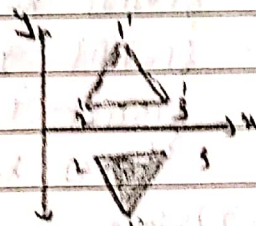
Requirements: Fedora 20, GCC compiler

Theory:

Reflection is nothing but producing mirror image of an object. Reflection can be done just by rotating the object about given axis of reflection with an angle of 180° .

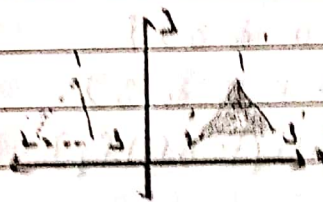
Reflection about x-axis:

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$



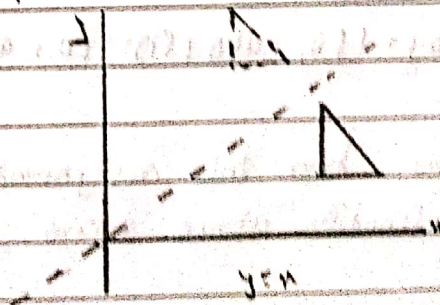
Reflection about y-axis:

$$\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$$



Reflection about line $y=x$:

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$



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Linearize algorithm for 2D transform:-

void Mainwindow: ref xy (x1, y1, x2, y2) {

int a[2][3], b[2][3], c[3][3]

for (int i=0 to 2) {

for (int j=0 to 3) {

a[i][j]=0

}

for (int i=0 to 3) {

for (int j=0 to 3) {

if (i==j)

c[i][j]=0;

}

}

}

c[0][0]=0;

b[0][0]=x1

b[1][0]=y1

c[0][1]=1;

b[0][1]=x2

b[1][1]=1

c[0][2]=1;

b[0][2]=1

c[1][0]=0;

b[1][0]=x2

for (int i=0 to 2) {

for (int j=0 to 3) {

for (int k=0 to 3)

a[i][j]=a[i][j]+b[i][k]*c[k][j];

}

}

data [a[0][0]+150, -a[0][1]+150, a[1][0]+150, -a[1][1]+150];

}

Conclusion: Thus, from this assignment we should able to perform basic 2D reflection about x-axis, y-axis & x=y axis.