

# Lab Assignment 5-6: Basic Transformation

## Objective:

To implement set of Basic Transformations on Polygon i.e. Translation, Rotation and Scaling

## Reference:

1. Xiang and Plastock , “Schaum's Outline Computer Graphics”, Second Edition

## Prerequisite:

Knowledge of:

- Basic Transformation
  - Translation
  - Scaling
  - Rotation
- Basic Coordinate Geometry
- C/C++ Programming

## Academic Honesty:

All work that you do toward fulfillment of this course's expectations must be your own unless collaboration is explicitly allowed (e.g., by some problem set or the final project). Viewing or copying another individual's work (even if left by a printer, stored in an executable directory, or accidentally shared in the course's virtual classroom) or lifting material from a book, magazine, website, or other source—even in part—and presenting it as your own constitutes academic dishonesty, as does showing or giving your work, even in part, to another student.

Similarly is dual submission academic dishonesty: you may not submit the same or similar work to this course that you have submitted or will submit to another. Nor may you provide or make available your or other students' solutions to individuals who take or may take this course in the future.

You are welcome to discuss the course's material with others in order to better understand it. You may even discuss problem sets with classmates, but you may not share code. You may also turn to the Web for instruction beyond the course's lectures and sections, for references, and for solutions to technical difficulties, but not for outright solutions to problems on projects. However, failure to cite (as with comments) the origin of any code or technique that you do discover outside of the course's lectures and sections (even while respecting these constraints) and then integrate into your own work may be considered academic dishonesty.

All forms of academic dishonesty are dealt with harshly.

## Problem Description:

Scaling Transformations:

A 2D point can be scaled by multiplication of the coordinate values  $(x,y)$  by scaling factors  $S_x$  and  $S_y$  to produce the transformed coordinates  $(x',y')$ .

Translation Transformations:

A 2D point can be translated by adding the coordinate values  $(x,y)$  by Translation distances  $T_x$  and  $T_y$  to produce the transformed coordinates  $(x',y')$ .

Rotation Transformations:

A 2D point can be rotated by repositioning it along a circular path in the  $xy$  plane. We specify the rotation angle  $\theta$  and the position of the rotation point about which the object is to be rotated. Multiplication of the coordinate values  $(x,y)$  by rotation matrix produce the transformed coordinates  $(x',y')$ .

Now you have to design a program which will provide you with the option that which type of transformation you want to do. Like the following,

***Enter your choice:***

- 1. Translation***
- 2. Scaling***
- 3. Rotation***
- 4. Exit***

After providing the choice you have to enter the number of edges of a polygon and then you have to input the coordinates of each vertex. Like the following,

***Enter the no. of edges:-4***

***Enter the co-ordinates of vertex 1:- 30 30***

***Enter the co-ordinates of vertex 2:- 30 90***

***Enter the co-ordinates of vertex 3:- 90 90***

***Enter the co-ordinates of vertex 4:- 90 30***

***Enter the Translation factor for x and y:-20 20***

After that you have to draw two polygons, one is the original polygon with supplied vertices and another is the transformed one.

### ***Evaluation Policy:***

Your code will be evaluated along the following axes.

**Correctness.** To what extent is your code consistent with our specifications and free of bugs?

**Design.** To what extent is your code written well (i.e., clearly, efficiently, elegantly, and/or logically)?

**Style.** To what extent is your code readable (commented and indented with variables aptly named)?