CSCI 480 / 580 – Lecture 16: Affine Transformations and Composition

Group members: _____   _____

                        _____   _____

1. Find two transformations, A and B, such that applying A then B results in a different picture than applying B then A. Given the unit square in the left column below, draw the shape with AB applied in the middle column and with BA applied in the right column. You don't need to write the transformation matrices.
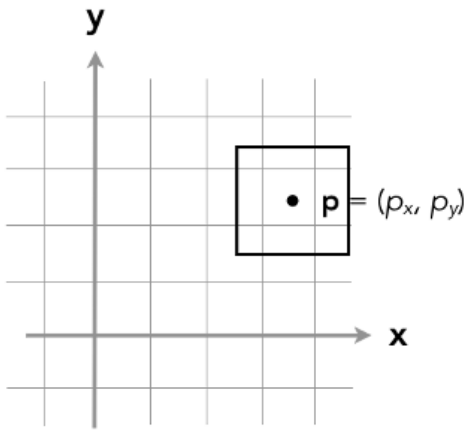
Original Shape   *A*B*Shape*   *B*A*Shape*
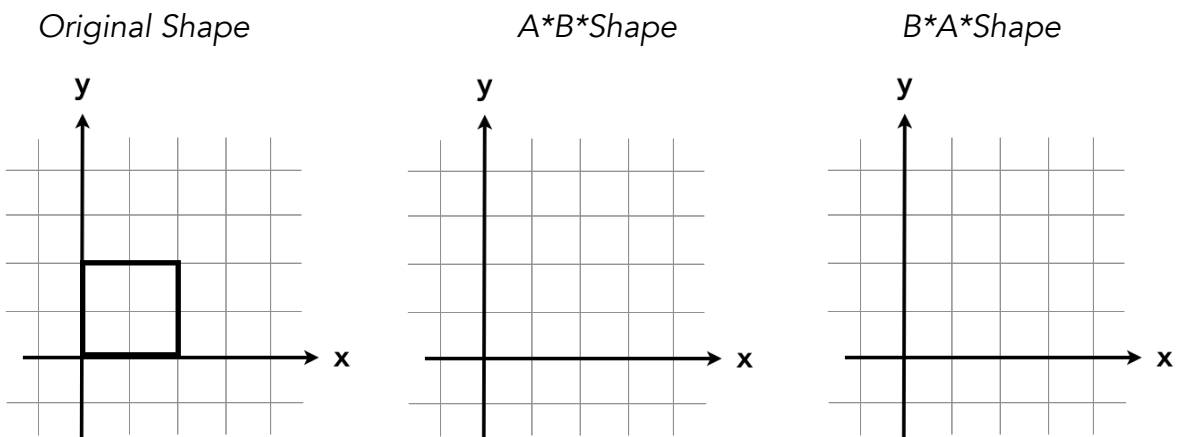
2. Find a transformation matrix A that transforms the unit square shown in the middle column to the shape in the right column.

Transformation Matrix   *Original Shape*   *Transformed Shape*

$$A = \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}$$
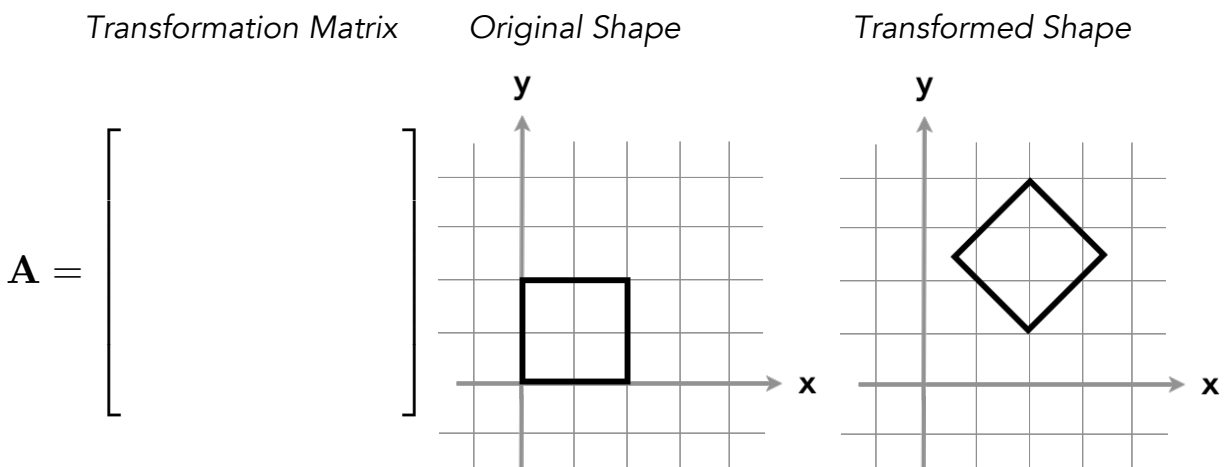
3. Consider the shape illustrated below; suppose it's a unit square centered at the point (p_x, p_y). Construct a transformation that rotates the shape 45 degrees counter-clockwise **around its center** (not around the origin). *Hint*: you may find it useful to build your transformation by composing multiple simpler transformations. If you do this, you don't need to write out the elements of the final matrix; just write the result as the product of the individual transformations.

Original Shape

Transformed Shape