CSCI 480 / 580 – Lecture 15: 2D Matrix Transformations

Group members: _____   _____

_____   _____

1. Warmup: perform the matrix multiplication below to multiply the 2D point *(x, y)* by the matrix **A**.

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} & \\ & \end{bmatrix}$$
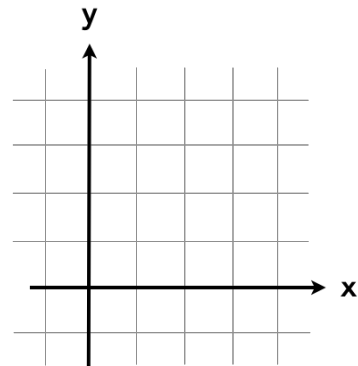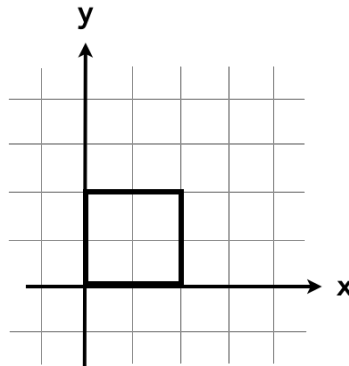
In each of the following problems, the graph in the middle column shows a unit square whose bottom-left corner is at the origin. Your task is to apply the transformation matrix **A** in the left column and draw the transformed shape in the graph on the right.

Transformation Matrix   *Original Shape*   *Transformed Shape*

$$\mathbf{A} = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$
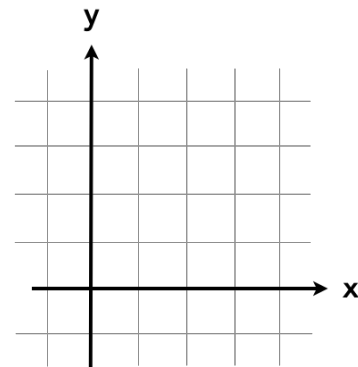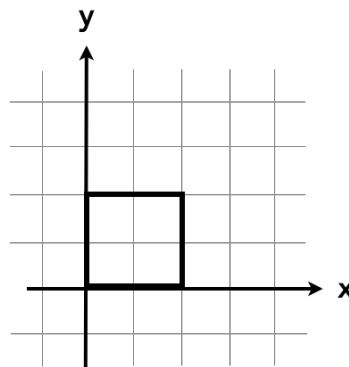
Describe this transformation in words:

*Transformation Matrix*   *Original Shape*   *Transformed Shape*

$$\mathbf{A} = \begin{bmatrix} 1 & 0.5 \\ 0 & 1 \end{bmatrix}$$
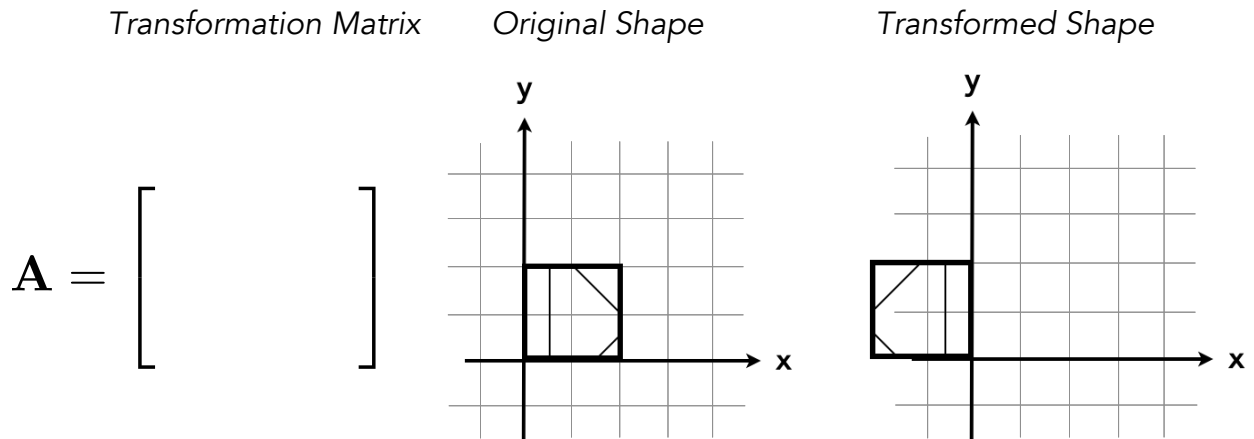
Describe this transformation in words:

In the following problems, you're given the unit square (middle column) and the transformed shape (right). In the left column, write the transformation matrix **A** that was used to perform this transformation.

Transformation Matrix   *Original Shape*   *Transformed Shape*

$$\mathbf{A} = \begin{bmatrix} & \\ & \end{bmatrix}$$
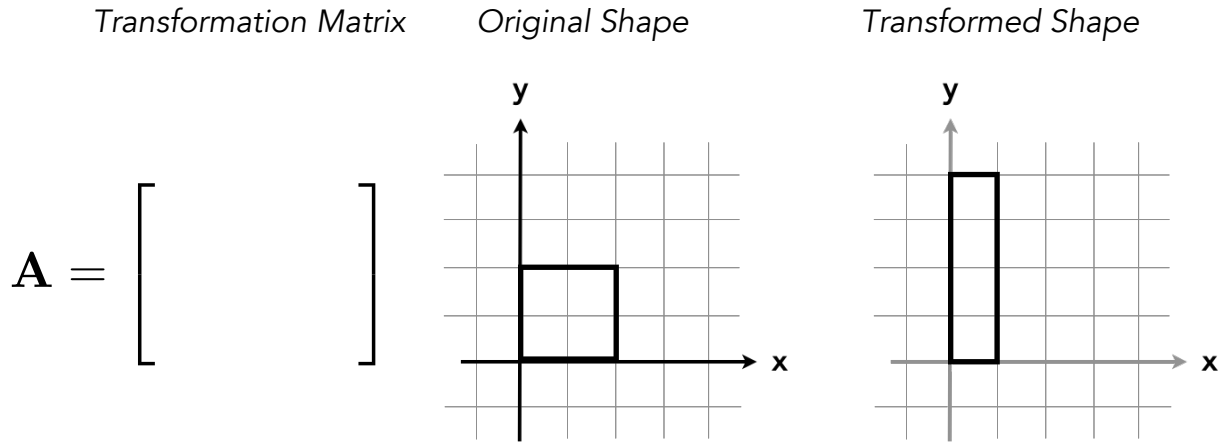
For this one, the unit square got some decorations to make sure there's no ambiguity about what happened to it.

Transformation Matrix   *Original Shape*   *Transformed Shape*

$$\mathbf{A} = \begin{bmatrix} & \\ & \end{bmatrix}$$

Here's one more:

Transformation Matrix   *Original Shape*   *Transformed Shape*

$$\mathbf{A} = \begin{bmatrix} & \\ & \end{bmatrix}$$