CSCI 480/580 Lecture 14 - In-Class Problems

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

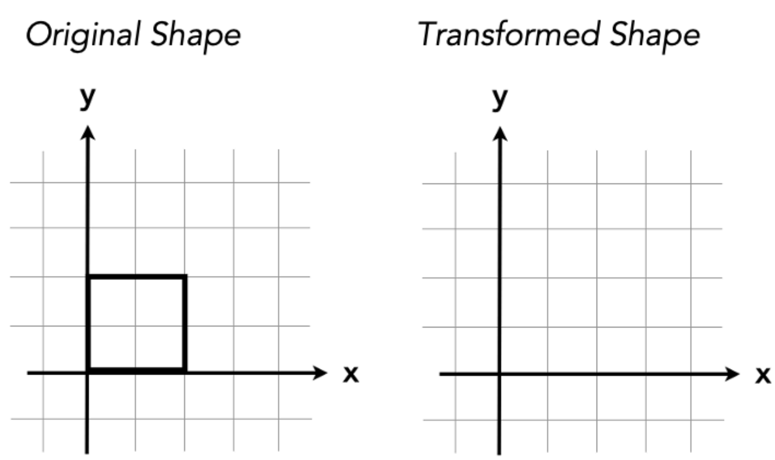
$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} =$$

In each of the following problems, the graph in the middle column shows a unit square whose corners are at $(0, 0)$, $(0, 1)$, $(1, 0)$, and $(1, 1)$. Your task is to apply the transformation matrix A in the left column and draw the transformed shape in the graph on the right. A simple way to go about this is to transform each of the square's corners, then connect the corners with lines to form the transformed square's edges.

For drawing, I recommend either awwapp.com or the Google Docs drawing editor. It may be useful to copy/paste the image into your drawing and then overlay your drawing on that.

Transformation Matrix

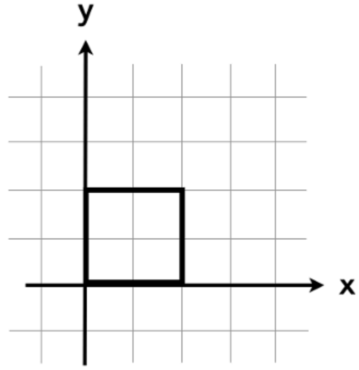
$$\mathbf{A} = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

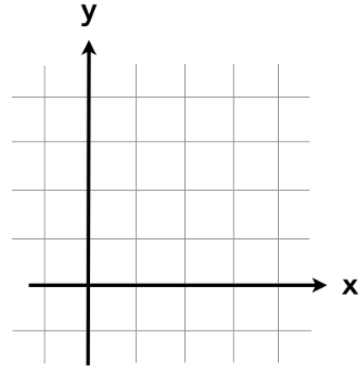


2. Describe what this transformation accomplishes in words:

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

$$\mathbf{A} = \begin{bmatrix} 1 & 0.5 \\ 0 & 1 \end{bmatrix}$$





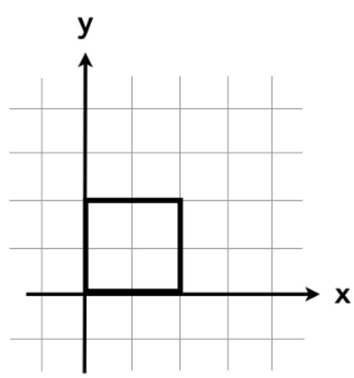
3. Describe what this transformation accomplishes in words:

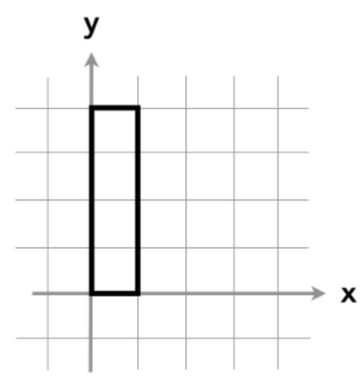
In the following problems, yo'ure given the unit square (middle column) and the transformed shape. In the left column, write the transformation matrix A that was used to perform this transformation.

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

4.

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



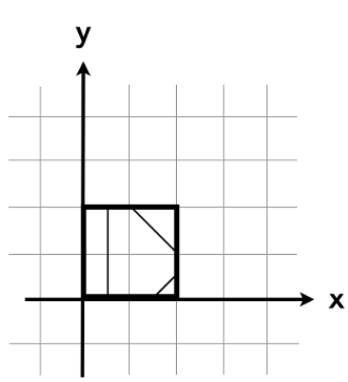


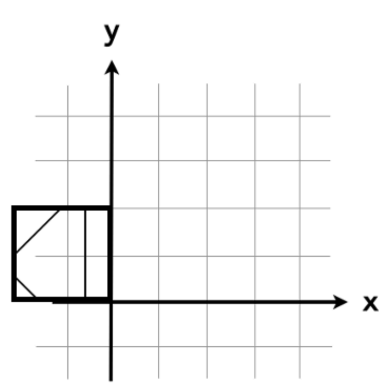
For this one, the unit square got some decorations to make sure there’s no ambiguity about what happened to it.

5. For this one, the unit square got some decoration to make sure there’s no ambiguity about what happened to it.

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

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





6. Okay, one more:

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