Math02B Assignment 2.7

Name

Give complete solutions to the following problems. Be sure to provide all the necessary steps to support your answers.

1. What 3x3 matrix will have the same effect on homogeneous coordinates for set of real numbers R² that the shear matrix A has?

$$\mathbf{A} = \begin{bmatrix} 1 & 0\\ 1.5 & 1 \end{bmatrix}$$

2. Use matrix multiplication to find the image of the triangle with data matrix

$$\mathbf{D} = \begin{bmatrix} -2 & -1 & -3 \\ 0 & 3 & 5 \end{bmatrix}$$

under the transformation that reflects points through the y-axis. Sketch both the original triangle and its image.

- 3. Find the 3x3 matrix that produces the described composite 2D transformation below, using homogeneous coordinates.
- a. Translate by (6,9), and then rotate 45 degrees about the origin. Confirm your answer by finding the image of (1,1)

b. Translate by (-3, 2), and then scale the x-coordinate by 2 and the y-coordinate by 3. Confirm your answer by finding the image of (1,1)

c. Reflect points through the y-axis and then rotate 30 degrees about the origin. Confirm your answer by finding the images of (1,0), and (0,1)

d. Projects points on the line y = 2x. then rotate 30 degrees about the origin. Confirm your answer by finding the images of (1,0), and (0,1)