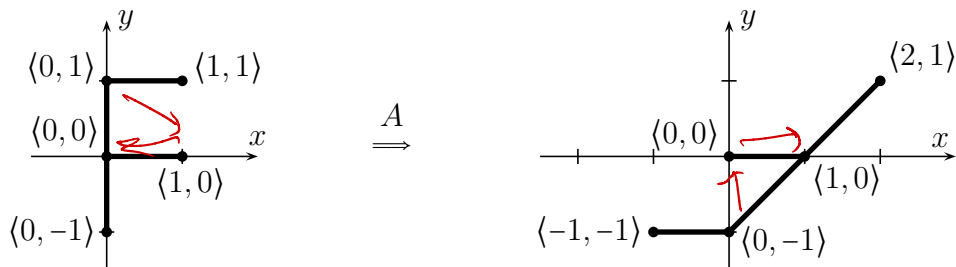


Name: Answer Key

PID:

Problems 2 and 3 concern the affine function  $A$  which maps the "F" shape as shown:



1. Give three different homogeneous coordinate representations for the point  $\langle 1, \frac{3}{2} \rangle \in \mathbb{R}^2$ .

$$\langle 1, \frac{3}{2}, 1 \rangle, \langle 2, 3, 2 \rangle, \langle 3, 6, 3 \rangle, \langle \frac{1}{2}, \frac{3}{4}, \frac{1}{2} \rangle$$

$$\langle -1, -\frac{3}{2}, -1 \rangle, \dots$$

2. Give a  $3 \times 3$  matrix which, when acting on homogeneous coordinates, represents the transformation  $A: \mathbb{R}^2 \rightarrow \mathbb{R}^2$  shown above.

$$M = \begin{pmatrix} -1 & -1 & 1 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

3. Now give a  $3 \times 3$  matrix which, when acting on homogeneous coordinates, represents the inverse  $A^{-1}$  of the transformation  $A$ .

$$N = \begin{pmatrix} -1 & 1 & 1 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

(To partly verify, note that  $M \circ N = \text{Identity}$ .)