These two problems ask you to express transformations in $\mathbb{R}^2$ as $3 \times 3$ matrices acting on homogeneous coordinates.

A linear map $f : \mathbb{R}^2 \to \mathbb{R}^2$ transforms the “F” shape as:

1. Give a $3 \times 3$ matrix $M$ which (acting on homogeneous coordinates) represents the transformation $f$.

2. Give a $3 \times 3$ matrix $N$ which (acting on homogeneous coordinates) represents the inverse $f^{-1}$ of $f$. 