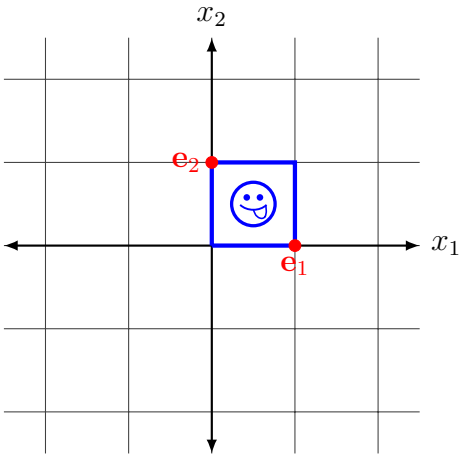
MATH 22 LECTURE 06 CLASSWORK: LINEAR TRANSFORMATIONS

JULY 03, 2017

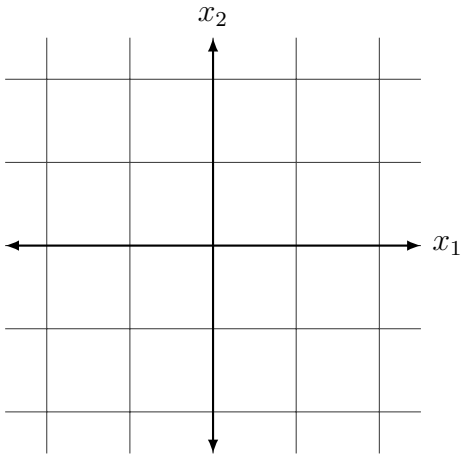
Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be defined by $T(\mathbf{x}) = A\mathbf{x}$ where A is a 2×2 matrix. For each specific 2×2 matrix A below please do the following:

(i) Draw where the standard unit vectors $\mathbf{e}_1$ and $\mathbf{e}_2$ are mapped by T.
(ii) Draw where the unit square is mapped by T.
(iii) Describe the map in words.
(iv) Sketch what T does to the smiley face.

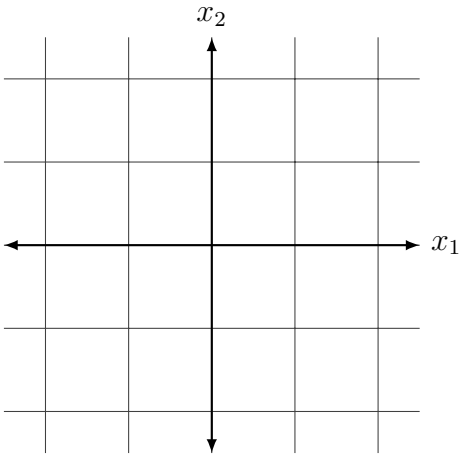
$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, identity map



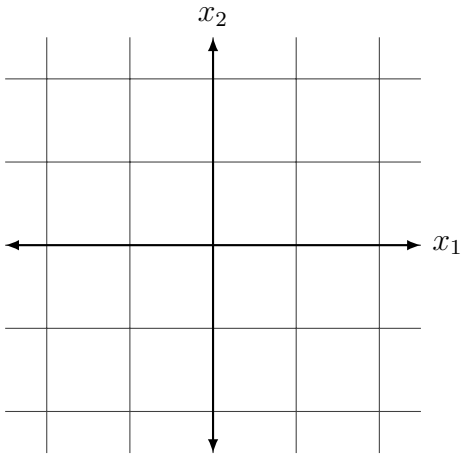
$A = \begin{bmatrix} 2 & 0 \\ 0 & 1/2 \end{bmatrix}$



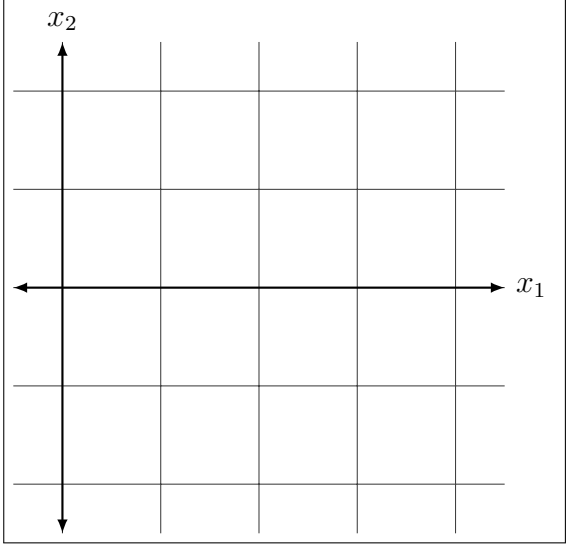
$A = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$



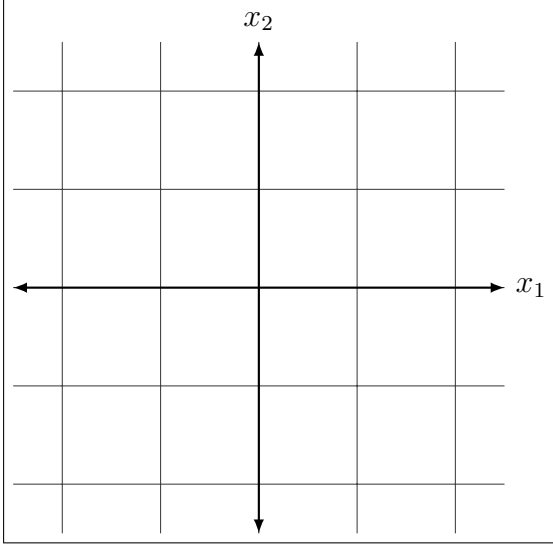
$A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$



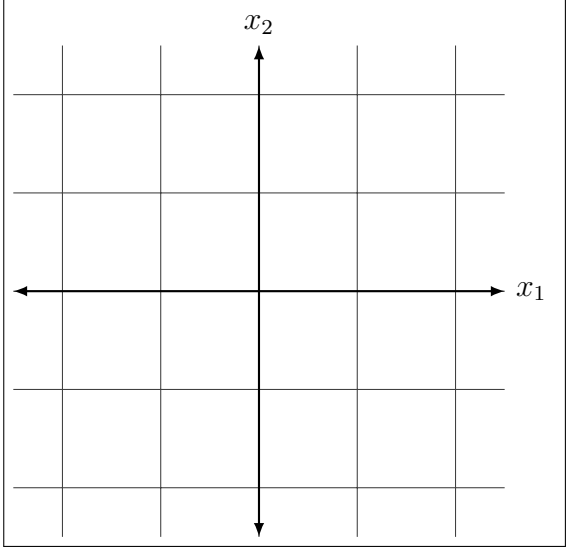
$$A = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$$



$$A = \begin{bmatrix} 1/2 & 1/2 \\ 1/2 & 1/2 \end{bmatrix}$$



$$A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}, \quad \theta = \pi/4$$



$$A = \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$$