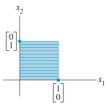
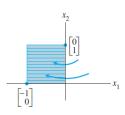
Certain matrix transformations are used to transform the unit square into different shapes. The following table shows some of such transformations.



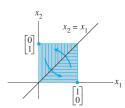
Transformation	Image of the Unit Square	Standard Matrix
Reflection through the x_1 -axis	x_2 $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ x_1	$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$
	0 -1	

Reflection through the x_2 -axis



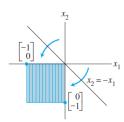
 $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$

Reflection through the line $x_2 = x_1$



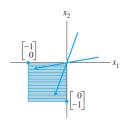
 $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

Reflection through the line $x_2 = -x_1$



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

Reflection through the origin



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

TABLE 2 Contractions and Expansions

Transformation	Image of	the Unit Square	Standar	d Matri
Horizontal contraction and expansion	$\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ $\begin{bmatrix} k \\ 0 \end{bmatrix}$ $0 < k < 1$	$\begin{bmatrix} x_2 \\ 0 \end{bmatrix}$ $k > 1$	$\begin{bmatrix} k \\ 0 \end{bmatrix}$	0 1
Vertical contraction and expansion	$\begin{bmatrix} x_2 \\ k \end{bmatrix}$ $0 < k < 1$	$\begin{bmatrix} x_2 \\ k \end{bmatrix}$ $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ $k > 1$	\[\begin{pmatrix} 1 & 0 & \\ 0 & \\ \ \ \ \ \ \ \ \ \ \ \ \	$\begin{bmatrix} 0 \\ k \end{bmatrix}$

TABLE 3 Shears

Transformation	Image of the Unit Square		Standard Matrix	
Horizontal shear $\begin{bmatrix} k \\ 1 \end{bmatrix}$	x_2 $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ $k < 0$	$ \begin{array}{c} x_2 \\ \begin{bmatrix} k \\ 1 \end{bmatrix} \\ k & \begin{bmatrix} 1 \\ 0 \end{bmatrix} \\ k > 0 \end{array} $	\[\begin{aligned} 1 \\ 0 \\ \\ -x_1 \end{aligned} \]	k 1

Vertical shear

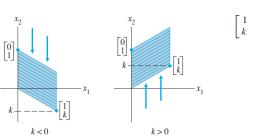


TABLE 4 Projections

Transformation	Image of the Unit Square	Standard Matrix
Projection onto the x_1 -axis	x ₂	$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$
	$\begin{bmatrix} 0 \\ 0 \end{bmatrix} \qquad \begin{bmatrix} 1 \\ 0 \end{bmatrix} \qquad x_1$	
Projection onto the x_2 -axis	$\begin{bmatrix} 0 \\ 1 \end{bmatrix}$	$\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$