Matrix Transformations

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

The identity matrix

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

The zero matrix

Enlargements

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

Reflections

$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$	
$\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$	
$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$	
$\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$	
$\begin{bmatrix} \cos 2\theta & \sin 2\theta \\ \sin 2\theta & -\cos 2\theta \end{bmatrix}$	

Rotations

$\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$	
$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$	
$\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$	
$\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$	
$\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$	

Shears

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

Matrix Transformations

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$ The identity matrix

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$ The zero matrix

Enlargements

$$a\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$ Enlargement scale factor A (both horizontal & vertical)

$$\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$$ Enlargement, horizontally scale factor a, vertically scale factor b.

Reflections

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$ Reflection in line $y = x$.

$$\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$$ Reflection in line $y = -x$.

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$ Reflection in x axis (line $y = 0$)

$$\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$$ Reflection in y axis (line $x = 0$)

$$\begin{bmatrix} \cos 2\theta & \sin 2\theta \\ \sin 2\theta & -\cos 2\theta \end{bmatrix}$$ Reflection in line $y = \tan \theta x$.

Rotations

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

Rotation 180° about the origin.

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

Rotation 90° anticlockwise about the origin.

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

Rotation 90° clockwise about the origin.

$$\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

Anticlockwise rotation of θ.

$$\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$$

Clockwise rotation of θ.

Shears

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

Shear horizontal (x axis invariant)

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

Shear vertical (y axis invariant)