

## 7.2) Reflections and rotations

## Worked example

Find a  $2 \times 2$  matrix that represents:

- A reflection in the  $y$ -axis.
  
  
  
  
  
  
  
  
  
  
- A reflection in the line  $y = x$

## Your turn

Find a  $2 \times 2$  matrix that represents:

- A reflection in the  $x$ -axis.

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

- A reflection in the line  $y = -x$

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





## Worked example

Describe fully the transformation

described by the matrix  $\begin{pmatrix} -\frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \end{pmatrix}$

## Your turn

Describe fully the transformation

described by the matrix  $\begin{pmatrix} \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$

Rotation  $45^\circ$  anticlockwise about the origin

## Worked example

For these transformations, state any invariant lines/points:

- reflection in the line  $y = -x$
  
  
  
  
  
  
  
  
  
  
- Rotation  $90^\circ$  anticlockwise about the origin

## Your turn

For these transformations, state any invariant lines/points:

- reflection in the line  $y = x$ 
  - Invariant lines:  
 $y = x$   
Any straight line with gradient  $-1$  ( $y = -x + k$ )
  - Invariant points:  
All points on those lines
  
  
  
  
  
  
  
  
  
  
- Rotation  $180^\circ$  about the origin
  - Invariant lines:  
Any straight line through origin ( $y = mx$ )
  - Invariant points:  
(0, 0)

## Worked example

$$P = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$

$U$  is the single geometrical transformation represented by the matrix  $P$ .

Given that  $U$  maps the point with coordinates  $(a, b)$  onto the point with coordinates  $(2a - 3, 1 - b)$ , find the values of  $a$  and  $b$

## Your turn

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

$U$  is the single geometrical transformation represented by the matrix  $P$ .

Given that  $U$  maps the point with coordinates  $(a, b)$  onto the point with coordinates  $(3 + 2a, b + 1)$ , find the values of  $a$  and  $b$

$$a = -2, b = 1$$