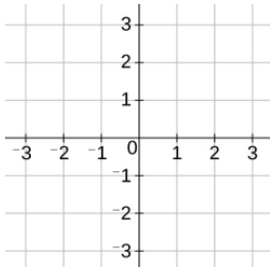
Rotations Using Matrices

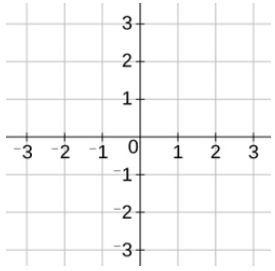
(a)

By considering the unit square, determine the matrix which describes a rotation $90°$ clockwise about the origin.



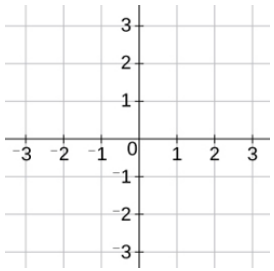
(b)

Describe fully the single transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$



(c)

By considering the unit square, determine the matrix which describes a rotation $180°$ about the origin.



(d)

The point $(1, -6)$ is mapped onto the point (a, b) when rotated $90°$ anti-clockwise about the origin. Using matrix algebra, find the values of a and b.

(e)

The point (c, d) is mapped onto the point $(2, 4)$ when rotated $270°$ anti-clockwise about the origin. Using matrix algebra, find the values of c and d.

(f)

A triangle with vertices at $(1, 1)$, $(5, 2)$ and $(4, -1)$ is rotated $180°$ about the origin. Use matrix algebra to find the coordinates of the vertices of the rotated triangle.

(g)

Use matrix algebra to show that a rotation of $90°$ clockwise about the origin, followed by a rotation of $180°$ is equivalent to a rotation of $90°$ anti-clockwise about the origin.

(h)

The point $(a, 6)$ is mapped onto the point $(b, -4)$ following a rotation of $90°$ anti-clockwise about the origin. Use matrix algebra to find the values of a and b.

(i)

The point $(x, 2y + 6)$ is mapped onto the point $(2x, y - 7)$ following a rotation of $90°$ clockwise about $(0, 0)$. Use matrix algebra to find the values of x and y.