(a) State the matrix A, associated with an anti-clockwise rotation of $\frac{\pi}{2}$ radians about the origin. **1**

The matrix B is given by

$$B = \begin{pmatrix} -\dfrac{\sqrt{3}}{2} & \dfrac{1}{2} \\ -\dfrac{1}{2} & -\dfrac{\sqrt{3}}{2} \end{pmatrix}$$

The matrix given by AB is associated with an anti-clockwise rotation of α radians about the origin.

(b) (i) Determine AB. **1**

(ii) Find the value of α. **1**

(c) Determine the least positive integer value of n such that $(AB)^n = I$, where I is the 2×2 identity matrix. **1**

Answers:

(a) $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$

(b) (i) $\begin{pmatrix} \dfrac{1}{2} & \dfrac{\sqrt{3}}{2} \\ -\dfrac{\sqrt{3}}{2} & \dfrac{1}{2} \end{pmatrix}$

(ii) $\dfrac{5\pi}{3}$

(c) 6