

5.

$$\mathbf{A} = \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & -\frac{1}{2} \end{pmatrix}$$

(a) Describe fully the single geometrical transformation  $U$  represented by the matrix  $\mathbf{A}$ . (3)

The transformation  $V$ , represented by the  $2 \times 2$  matrix  $\mathbf{B}$ , is a reflection in the line  $y = -x$

(b) Write down the matrix  $\mathbf{B}$ . (1)

Given that  $U$  followed by  $V$  is the transformation  $T$ , which is represented by the matrix  $\mathbf{C}$ ,

(c) find the matrix  $\mathbf{C}$ . (2)

(d) Show that there is a real number  $k$  for which the point  $(1, k)$  is invariant under  $T$ . (4)