10

$$\mathbf{A} = \begin{pmatrix} 2k^2 & k-9 \\ -3k & k+1 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 1 & -5 \\ 3 & k \end{pmatrix}$$

The determinant of matrix **A** is equal to the determinant of matrix **B**

(a) Show that k is a root of the equation

$$2k^3 + 5k^2 - 28k - 15 = 0$$

(3)

Given that $f(k) = 2k^3 + 5k^2 - 28k - 15$

(b) use the factor theorem to show that $(k + 5)$ is a factor of $f(k)$

(2)

(c) Hence, factorise completely $f(k)$

(4)

The transformation with matrix **C**, where **C** is a 2×2 matrix, is equivalent to the transformation with matrix **A** followed by the transformation with matrix **B**

Given that k is positive,

(d) find matrix **C**

(3)

$$\left[\textbf{Determinant of matrix } \begin{pmatrix} a & b \\ c & d \end{pmatrix} = ad - bc \right]$$

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 12 marks)