11 With respect to the origin O, the points A, B, C and D have position vectors given by

$$\overrightarrow{OA} = \begin{pmatrix} 1 \\ 5 \\ 3 \end{pmatrix}, \qquad \overrightarrow{OB} = \begin{pmatrix} 0 \\ 4 \\ 1 \end{pmatrix}, \qquad \overrightarrow{OC} = \begin{pmatrix} 1 \\ -3 \\ 1 \end{pmatrix} \qquad \text{and} \qquad \overrightarrow{OD} = \begin{pmatrix} 3 \\ -5 \\ 4 \end{pmatrix}.$$

The line m passes through the points A and B.

(a) Find a vector equation for m. [2]

(b) Find the position vector of the point of intersection of m and the line passing through the points C and D. [4]

(c) Find the position vector of the foot of the perpendicular from C to m. [4]

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.