

7.

$$\mathbf{M} = \begin{pmatrix} 2 & -1 & 1 \\ 3 & k & 4 \\ 3 & 2 & -1 \end{pmatrix} \quad \text{where } k \text{ is a constant}$$

(a) Find the values of  $k$  for which the matrix  $\mathbf{M}$  has an inverse.

(2)

(b) Find, in terms of  $p$ , the coordinates of the point where the following planes intersect

$$2x - y + z = p$$

$$3x - 6y + 4z = 1$$

$$3x + 2y - z = 0$$

(5)

(c) (i) Find the value of  $q$  for which the set of simultaneous equations

$$2x - y + z = 1$$

$$3x - 5y + 4z = q$$

$$3x + 2y - z = 0$$

can be solved.

(ii) For this value of  $q$ , interpret the solution of the set of simultaneous equations geometrically.

(4)