

7. The plane  $\Pi_1$  has equation

$$\mathbf{r} \cdot (2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}) = -8$$

(a) Find the perpendicular distance from the point  $(8, 2, 10)$  to  $\Pi_1$

(3)

The plane  $\Pi_2$  has equation

$$\mathbf{r} = \lambda(\mathbf{i} + 3\mathbf{j} + \mathbf{k}) + \mu(2\mathbf{i} - \mathbf{j} + \mathbf{k})$$

where  $\lambda$  and  $\mu$  are scalar parameters.

(b) Show that the vector  $4\mathbf{i} + \mathbf{j} - 7\mathbf{k}$  is perpendicular to  $\Pi_2$

(2)

(c) Find, to the nearest degree, the acute angle between  $\Pi_1$  and  $\Pi_2$

(3)

(d) Find a vector equation of the line of intersection of the planes  $\Pi_1$  and  $\Pi_2$

(4)