5. The lines L_1 and L_2 have vector equations

L_1: $\mathbf{r} = -2\mathbf{i} + 11.5\mathbf{j} + \lambda(3\mathbf{i} - 4\mathbf{j} - \mathbf{k})$,

L_2: $\mathbf{r} = 11.5\mathbf{i} + 3\mathbf{j} + 8.5\mathbf{k} + \mu(7\mathbf{i} + 8\mathbf{j} - 11\mathbf{k})$,

where λ and μ are parameters.

(a) Show that L_1 and L_2 do not intersect.

(5)

(b) Show that the vector $(2\mathbf{i} + \mathbf{j} + 2\mathbf{k})$ is perpendicular to both L_1 and L_2.

(2)

The point A lies on L_1, the point B lies on L_2 and AB is perpendicular to both L_1 and L_2.

(c) Find the position vector of the point A and the position vector of the point B.

(8)