

The lines  $l$  and  $m$  have vector equations

$$\mathbf{r} = -\mathbf{i} + 3\mathbf{j} + 4\mathbf{k} + \lambda(2\mathbf{i} - \mathbf{j} - \mathbf{k}) \quad \text{and} \quad \mathbf{r} = 5\mathbf{i} + 4\mathbf{j} + 3\mathbf{k} + \mu(a\mathbf{i} + b\mathbf{j} + \mathbf{k})$$

respectively, where  $a$  and  $b$  are constants.

- (a) Given that  $l$  and  $m$  intersect, show that  $2b - a = 4$ .

[4]

[illegible]

- (b)** Given also that  $l$  and  $m$  are perpendicular, find the values of  $a$  and  $b$ . [4]

[illegible]

- (c) When  $a$  and  $b$  have these values, find the position vector of the point of intersection of  $l$  and  $m$ . [2]

[illegible]