

Question 1.¹ (1 mark each) Complete the following sentences with the word **must**, **might** or, **cannot**, as appropriate.

a. If \vec{u} and \vec{v} are nonzero vectors in \mathbb{R}^3 , then $(\vec{u} \times \vec{v}) \cdot \vec{u}$ _____ be equal to 0.

Question 2.¹ (5 marks) Let \vec{u} and \vec{v} be non-zero vectors in \mathbb{R}^3 . Show that if $\frac{1}{\|\vec{u} \times \vec{v}\|}(\vec{u} \times \vec{v})$ is a unit vector then the angle between \vec{u} and \vec{v} is 45° or 135° .

Question 3.² Given the line $\mathcal{L} : (x, y, z) = (2, 2, 3) + t(1, -1, -3)$ where $t \in \mathbb{R}$, the plane $\mathcal{P} : 3x - 2y + 2z = 7$ and the point $A(1, 1, 1)$.

a. (5 marks) Find parametric equations of the line which contains A , intersects \mathcal{L} and which is parallel to \mathcal{P} .

b. (5 marks) Find parametric equations of the line which contains A and which intersects \mathcal{L} at a right angle.

¹From John Abbott Final Examinations.

²From a Dawson College Final Examination.