

Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531***. You **must** show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. (4 marks) Determine whether $H = \{(a, b) \mid a, b \in \mathbb{R} \text{ and } ab = 0\}$, is a subspace of \mathbb{R}^2

Question 2. (4 marks) Let V be the subspace of vectors parallel to the line $\mathbf{x} = (1, 2, 3) + t(1, 1, 1)$ where $t \in \mathbb{R}$, and let W be the subspace spanned by $(1, 1, 0)$ and $(0, 1, 1)$. Find a vector \mathbf{v} in V and a vector \mathbf{w} in W for which $\mathbf{v} + \mathbf{w} = (1, 0, 1)$

Question 3. (4 marks) Prove that in \mathbb{P}_2 every set with more than three vectors is linearly dependent.