

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.** (5 marks) Determine whether the following is a subspace of  $\mathcal{M}_{n \times n}$ : The set of all  $n \times n$  matrices such that  $AB = BA$  for some fixed  $n \times n$  matrix  $B$ .

**Question 2.** (5 marks) Let  $V$  be the solution space of the equation  $4x - y + 2z = 0$ , and let  $W$  be the subspace of  $\mathbb{R}^3$  spanned by  $(1, 1, 1)$ . Find a vector  $\vec{v}$  in  $V$  and a vector  $\vec{w}$  in  $W$  for which  $\vec{v} + \vec{w} = (1, 0, 1)$ .