

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. (1 mark each) Complete each of the following sentences with **MUST**, **MIGHT**, or **CANNOT**.

a. Let A be a square matrix. If $A\mathbf{x} = A\mathbf{y}$ for distinct \mathbf{x} and \mathbf{y} , then A _____ be invertible.

Question 2. (5 marks) Show that every matrix A can be factored as $A = UR$ where U is invertible and R is in reduced row-echelon form.

Question 3. (5 marks) Prove that if A and B are $m \times n$ matrices, then A and B are row equivalent if and only if A and B have the same reduced row echelon form.