

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 (5 marks) Consider the following Gauss-Jordan reduction:

$$\underbrace{\begin{bmatrix} -2 & 5 & 4 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_A \sim \underbrace{\begin{bmatrix} -2 & 5 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{E_1 A} \sim \underbrace{\begin{bmatrix} 1 & 0 & 0 \\ -2 & 5 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{E_2 E_1 A} \sim \underbrace{\begin{bmatrix} 1 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{E_3 E_2 E_1 A} \sim \underbrace{\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{E_4 E_3 E_2 E_1 A} = I$$

Find E_1, E_2, E_3, E_4 and express A as a product of elementary matrices.

Question 2. Determine whether the following statements are true or false for any $n \times n$ matrices A and B . If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

1. (3 marks) If A is an invertible matrix and B is row equivalent to A , then B is also invertible.

2. (3 marks) An expression of an invertible matrix A as a product of elementary matrices is unique.

¹from WeBWorK