

Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531**¹. 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) Solve for the matrix X if $(D + XB)^{-1}XA = (ED)^{-1}$. Assume that all matrices are $n \times n$ and invertible as needed.

Question 2.(4 marks) Show that if A is a square matrix such that $A^k = 0$ for some positive integer k , then the matrix $I - A$ is invertible and $(I - A)^{-1} = I + A + A^2 + \dots + A^{k-1}$

Question 3.(3 marks) Determine whether the following statement is true or false. If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

The sum of two invertible matrices of the same size must be invertible.

¹based on a WeBWorK problem