name:

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.** (2 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.

If A and B are square matrices of the same order, then  $(AB)^T = A^T B^T$ .

**Question 2.** (3 marks) Prove: If A and B are  $n \times n$  matrices, then tr(A+B) = tr(A) + tr(B)

**Question 3.** (5 marks) Consider the matrices

$$A = \begin{bmatrix} 3 & 0 \\ -1 & 2 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & -1 \\ 0 & 2 \end{bmatrix}, C = \begin{bmatrix} 1 & 4 & 2 \\ 3 & 1 & 5 \end{bmatrix}, D = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{bmatrix}.$$

Solve for *X*, if possible.

trace(D)X + 2B = CA