Dawson College: **Linear Algebra** (SCIENCE): 201-NYC-05-S7: Fall 2022: **Quiz 4** 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.[1] *(5 marks)* Given that A and B are invertible with $B = B^T$, solve for matrix X, if possible. Your answer should be expressed as a single term.

$B^T AX - A = (B-I)(B+I)A$

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

2. *(3 marks)* A square matrix A is *idempotent* if $A^2 = A$. If A is idempotent then A is singular or $A = I$. *Hint: Its true! And prove it by contradiction.*

[1] from a past John Abbott final examination