Dawson College: **Linear Algebra** (SCIENCE): 201-NYC-05-S7: Fall 2022: **Quiz 6** 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. *(4 marks)* Let A be an $n \times m$ matrix, such that $A^T A = I_m$. Show that $I_n - 2AA^T$ is its own inverse and symmetric.

Question 2. *(2 marks)* If $(1,2,3,4,5)$ and $(4,0,4,3,1)$ are both solutions of a system of 13 linear equations find a third solution of the system.

Question 3. 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 and B are square matrices such that AB can be expressed as a product of elementary matrices, then the system $A\mathbf{x} = \mathbf{b}$ has exactly one solution.