Dawson College: **Linear Algebra** (SCIENCE): 201-NYC-05-S5: Fall 2024: **Quiz 1** 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. *(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.

If AB and BA are both defined, then AB and BA are square matrices.

Question 2. Find the values of k for which the following system has:

$$\begin{cases} x+ & y+ & 2z=-1 \\ -x+(k^2-2)y+(2k-4)z=k+4 \\ x+ & y+(k^2+k)z=k+1 \end{cases}$$

a. Exactly one solution, justify.

b. No solutions, justify.

c. Infinitely many solutions, justify.

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.

If A and B are square matrices of the same order, then $\text{tr}(AB) = \text{tr}(A)\text{tr}(B)$.

Question 4. *(6 marks)* Find **all** matrices A, if any, such that A and B commute where $B = \begin{bmatrix} 2 & 3 \\ 5 & 4 \end{bmatrix}$.