Dawson College: **Linear Algebra** (SCIENCE): 201-NYC-05-S6: Fall 2024: **Quiz 2** 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 $AB+BA$ is defined, then A and B are square matrices of the same size.

Question 2. *(6 marks)* Consider the system

$$\begin{array}{rcrcrcl} 2kx & + & (k+1)y & & & = & 2 \\ x & + & y & + & z & = & 0 \\ kx & + & (2k-1)y & & & = & 1 \end{array}$$

Find the value(s) of k, if any, such that the system has:

a. no solutions, justify.

b. a unique solution, justify.

c. infiniely 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 $(AB)^T = A^T B^T$.

Question 3. *(6 marks)* Find **all** matrices A such that $A \begin{bmatrix} 2 & 3 \\ 5 & 7 \\ -2 & -3 \end{bmatrix} - \begin{bmatrix} 1 \\ 2 \end{bmatrix}^T = \text{trace}\left(\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \right) \begin{bmatrix} 1 \\ 2 \end{bmatrix}^T$.