**Dawson College**: **Linear Algebra** (SCIENCE): 201-NYC-05-S8: Winter 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 the number of equations in a linear system is strictly more than the number of unknowns, then the system must be consistent.

**Question 2.** *(3 marks)* In each of the following, find (if possible) conditions on $k$ such that the system has no solution and one solution.

$$\begin{cases} x & +ky = 2 \\ kx & + y = 4 \end{cases}$$

**Question 3.** *(2 marks)* Consider the following augmented matrix of a consistent linear system.

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}$$

Find a row which can be added to the augmented matrix to make a new system with infinitely many solutions. Justify.

**Question 4.** *(3 marks)* Illustrate **all** relative positions of lines in a linear system with a unique solution consisting of four lines.