**Dawson College**: **Linear Algebra** (SCIENCE): 201-NYC-05-S6: Fall 2024: **Quiz 3** 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)* Prove: If the reduced row echelon form of $A$ is $I_n$, and $E$ is an $n \times n$ elementary matrix, then the system $EA^2A^T\mathbf{x} = \mathbf{0}$ has only the trivial solution.

**Question 2.** *(5 marks)* Solve for the matrix $A$ in the following equation:

$$\begin{bmatrix} -1 & 1 \\ -2 & 3 \end{bmatrix} \left( \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix} + 3(A^{-1})^T \right)^{-1} = A^T$$

**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 $A$ is an invertible matrix and $B$ is row equivalent to $A$, then $B$ is also invertible.

**Question 4.** *(5 marks)* Given $A = \begin{bmatrix} 0 & 2 & 0 \\ 1 & 0 & 0 \\ 0 & 3 & 0 \end{bmatrix}$. Find an invertible matrix $U$ such that $A = UR$ where $R$ is the reduced row echelon form of $A$.