Dawson College: Fall 2019: Linear Algebra (SCIENCE): 201-NYC-05-S5: **Quiz 5** name: ______________________________

No books, watches, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1.[1] *(3 marks)* Show that if A and B are square matrices such that AB is invertible, then A can be written as a product of elementary matrices.

Question 2.[1] Given the matrix $A = \begin{pmatrix} 0 & 1 & 0 \\ 5 & 0 & 0 \\ 0 & 1 & 1 \end{pmatrix}$.

a. *(3 marks)* Find A^{-1}.

b. *(2 marks)* Express A^{-1} as a product of elementary matrices, if possible. **Justify your work!**

c. *(2 marks)* Express A as a product of elementary matrices, if possible. **Justify your work!**

[1]From a past Dawson final examination

Question 3. Determine whether the following statements are true or false. If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

a. *(3 marks)* If A and B are row equivalent matrices, then the linear systems $Ax = 0$ and $Bx = 0$ have the same solution set.

b. *(3 marks)* Let A be an $n \times n$ matrix and S is an $n \times n$ invertible matrix. If $\mathbf{x}$ is a solution to the linear system $(S^{-1}AS)\mathbf{x} = \mathbf{b}$, then $S\mathbf{x}$ is a solution to the linear system $A\mathbf{y} = S\mathbf{b}$.

c. *(3 marks)* Every elementary matrix is invertible.

Bonus. *(3 marks)* Find the formula for the n-th power of this matrix. $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$