Dawson College: Winter 2019: Linear Algebra (SCIENCE): 201-NYC-05-S6: **Quiz 7** 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)* Complete the following sentences with the word **must**, **might** or, **cannot**, as appropriate.

a. If A is a product of elementary matrices, then $det(A)$ _____ equal zero.

Let A and B be invertible $n \times n$ matrices. Let C be a non-invertible $n \times n$ matrix.

b. $A + C$ _____ be invertible.

c. AC and BC _____ have the same determinant.

Question 2.[2] *(5 marks)* Given A, an $n \times n$ matrix such that $\det(A) = 9$ and

$$A^3 A^T = 3A^{-1}\text{adj}(A)$$

find n.

Question 3.[1] *(5 marks)* Let $\det\left(\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}\right)$ be a nonzero value n. Use Cramer's Rule to solve for x_3 only in the system of linear equations below:

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & a & b & c \\ 0 & d & e & f \\ 0 & g & h & i \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0 \\ 3b + 2c \\ 3e + 2f \\ 3h + 2i \end{bmatrix}$$

Question 4. *(2 marks)* 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.
If A and B are square matrices of the same size such that $\det(A) = \det(B)$, then $\det(A + B) = 2\det(A)$.

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[1] From John Abbott Final Examinations.

[2] From a Dawson College Final Examination.