MATH 4341: Linear Algebra

QUIZ-1 **WINTER SEMESTER, 2022-2023**
DURATION: 30 MINUTES **FULL MARKS: 15**
Student ID: **SET: A**

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1. You are given a vector $A(x, y, z)$.

   a) Find the matrix P that multiplies A to give $B(z - 2x, z, x - 5y)$. 2 (CO1) (PO1)

   b) Find the matrix Q that multiplies $B(z - 2x, z, x - 5y)$ to bring back A. 3 (CO1) (PO1)

2. Consider the following system of equations.

$$\begin{aligned} 2x + 5y + z &= 0 \\ 4x + ay + z &= 2 \\ y + z &= 3 \end{aligned}$$

   a) For which choice of a does Gaussian elimination require you to swap the second and third rows? 2 (CO1) (PO1)

   b) For which choice of a is the matrix of the system singular (no third pivot)? 3 (CO1) (PO1)

3. Consider the following Matrix, A.

$$\begin{bmatrix} a & b & b \\ a & a & b \\ a & a & a \end{bmatrix}$$

   a) Find the conditions on a and b that make the matrix A invertible. 2 (CO1) (PO1)

   b) Find A^{-1} when it exists. 3 (CO1) (PO1)