姓名:_____ 葉均承 應數一線性代數

學號: _____ **Quiz 9** 考試日期: 2023/11/15

不可使用手機、計算器，禁止作弊!

1. Is $T([x, y]) = [5x + 4y, x + y, x + 1]$ a linear transformation of $\mathbb{R}^2$ to $\mathbb{R}^3$? Why or why not?

2. Given $A \sim H$, please answer the following questions.

$$A = \begin{bmatrix} 9 & 4 & 0 & 6 & 1 \\ 9 & 0 & 2 & -2 & 5 \\ -6 & 4 & 2 & 4 & -2 \\ -3 & 6 & 1 & 8 & -3 \\ 3 & -4 & 3 & -9 & 6 \end{bmatrix}, H = \begin{bmatrix} 3 & 0 & 0 & 0 & 1 \\ 0 & 2 & 0 & 3 & -1 \\ 0 & 0 & 1 & -1 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

(a) the **rank** of matrix A, is _____.

(b) Is A invertible? _____.

(c) a basis for the **row space** of A is _____.

(d) a basis for the **column space** of A is _____ .

(e) a basis for the **nullspace** of A is _____.

3. Let $T([x, y, z]) = [y - z, 2x + z, -x + 2y + z]$ an invertible linear transformation from $\mathbb{R}^3$ to $\mathbb{R}^3$. Find $T^{-1}([5, -3, 2])$.

   Answer: $T^{-1}([5, -3, 2]) =$ _____