

MAC 3105-2A  
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Quiz 2  
05/25/2017

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

INSTRUCTIONS:

- Write answer in the space provided after the problems.
- Clearly show ALL work and circle/box answer.
- Keep Calm and Enjoy Linear

1. 'TRICK OR TREAT'

Determine whether the statement is true or false. If it is true, say so; if it is false, explain why or give an example that disproves the statement.

(1) (5pts) Any 4 vectors in  $\mathbb{R}^3$  are linear dependent.

(2) (5pts) The map  $T: \mathbb{R} \rightarrow \mathbb{R}$  sending  $x \mapsto x + 2$  is a linear transform.

(3) (5pts) The matrix equation  $AX = 0$  has infinitely many solutions for any  $3 \times 4$  matrix  $A$ .

(4) (5pts) The **Kernel** of any linear transform contains 0.

## 2. DEFINITION

Write down the definitions of the following terminologies.

(1) (5pts) The vectors  $\{u_1, u_2, \dots, u_k\}$  are **linear independent**.

(2) (5pts) A **Linear transform** from  $\mathbb{R}^n$  to  $\mathbb{R}^m$ .

(3) (5pts) The **Span Space** of  $u_1, u_2, u_3$ .

(4) (5pts) What is your major ?

## 3. HARDCORE PROBLEMS

3.1. **(20pts)**. Find the solution set to the following augmented matrix. If the set is infinite, **Parametrize** the solution set.

$$\left[ \begin{array}{ccc|c} 1 & 2 & 3 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 2 & 1 \end{array} \right]$$

3.2. (20pts). Are the column vectors of the following matrix linear independent or not ? **Explain** why.

$$\begin{bmatrix} 1 & 3 & 4 \\ 1 & 1 & 1 \\ 1 & 2 & 4 \\ 2 & 2 & 3 \end{bmatrix}$$

3.3. **(20pts)**. Let  $T: \mathbb{R}^3 \rightarrow \mathbb{R}^4$  be the linear transform that sends a vector  $(x_1, x_2, x_3)$  to  $3x_1 + x_2 - 9x_3, 2x_2 - x_3, x_1 + x_2, 2x_1 - x_2 + x_3$ . Write the matrix that represents the linear transform  $T$ .

SCRATCH HERE