

Name:

Recitation Section:

Math 2802 N1-N3 Quiz

February 2nd, 2018

The quiz has a total of 10 points and you have 15 minutes. Read carefully and clearly justify how you obtained your answers.

1. [3 points] Find all the values of h for which the following vectors are linearly dependent:

$$v_1 = \begin{pmatrix} 1 \\ -2 \\ 4 \end{pmatrix} \quad v_2 = \begin{pmatrix} 3 \\ -5 \\ 10 \end{pmatrix} \quad v_3 = \begin{pmatrix} -1 \\ 5 \\ h \end{pmatrix}$$

2. [3 points] Is the following transformation $T : \mathbf{R}^n \rightarrow \mathbf{R}^n$ invertible? Justify your answer.

$$T \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 3x - y + z \\ -5x + 5y - 2z \\ 10x + 4z \end{pmatrix}$$

Turn the page!

3. [4 points]

For this problem, use the following row-reduction of A .

$$A = \begin{pmatrix} 1 & -3 & 4 & -1 & 5 \\ 3 & -9 & 7 & -2 & 9 \\ -2 & 6 & -3 & 1 & -4 \\ -1 & 3 & 6 & -1 & 7 \end{pmatrix} \sim \begin{pmatrix} 1 & -3 & 4 & -1 & 5 \\ 0 & 0 & -5 & 1 & -6 \\ 0 & 0 & 5 & -1 & 6 \\ 0 & 0 & 10 & -2 & 12 \end{pmatrix} \sim \begin{pmatrix} 1 & -3 & 4 & -1 & 5 \\ 0 & 0 & -5 & 1 & -6 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Let $A = LU$ where L is a lower triangular matrix and U is an echelon form.

- The dimensions of L : _____ rows \times _____ columns
- The dimensions of U : _____ rows \times _____ columns
- Construct the matrices L and U .