

## Homework 5a

MAT 255, FALL 2016

1. Let  $\mathbf{u}, \mathbf{v}$  be vectors in  $\mathbb{R}^n$ . Prove that  $\mathbf{u} - \mathbf{v} = \mathbf{0}$  if and only if  $\mathbf{u} = \mathbf{v}$ .
2. Classify the following transformations as linear or nonlinear. Provide the necessary support for your answer. On all of these problems, we assume the vector  $\mathbf{v}$  has components

$$\mathbf{v} = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}.$$

(a)  $T(\mathbf{v}) = \begin{bmatrix} v_2 \\ v_1 \end{bmatrix}$

(b)  $T(\mathbf{v}) = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

(c)  $T(\mathbf{v}) = v_1 + v_2$

(d)  $T(\mathbf{v}) = v_1 v_2$