QUIZ September 23, 2013

1. Suppose

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \quad \text{and} \quad \mathbf{u} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}.$$

Let T be the linear transformation $\mathbf{x} \mapsto A\mathbf{x}$. Then

$$T(\mathbf{u}) = \begin{bmatrix} 6 \\ 15 \\ 0 \end{bmatrix}.$$

2. A *linear transformation* is any map such that

(a) $T(\mathbf{u} + \mathbf{v}) = T(\mathbf{u}) + T(\mathbf{v})$ for all $\mathbf{u}, \mathbf{v}$ in the domain of T.

(b) $T(c\mathbf{u}) = T(\mathbf{u})$ for all scalars c and all $\mathbf{u}$ in the domain of T.

3. Let A be a 3×4 matrix whose entries are all zero. The range of the linear transformation $\mathbf{x} \mapsto A\mathbf{x}$ is the zero vector in $\mathbb{R}^3$.

4. The following matrix represents a dilation on $\mathbb{R}^2$:

$$\begin{bmatrix} 0.3 & 0 \\ 0 & 0.3 \end{bmatrix}.$$

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