

QUIZ September 25, 2013

Clicker Instructions: A = True; B = False;
C = I don't know; D = No truth value

correct = 1pt; don't know = 0pt; wrong = -1pt

1. Suppose that $T : \mathbb{R}^2 \rightarrow \mathbb{R}^4$ is a linear transformation and suppose that

$$T \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix}, \quad T \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 0 \end{pmatrix}.$$

Then T is the transformation $\mathbf{x} \mapsto A\mathbf{x}$ where

$$A = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

2. The linear transformation which reflects vectors through the line $x_2 = -x_1$ is

$$A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

3. The matrix

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 2 & 2 \end{bmatrix}$$

is one-to-one but not onto.

4. Suppose $1 \leq m < n$. Then an $n \times m$ matrix cannot be onto its codomain.
5. Suppose $1 \leq m < n$. Then an $n \times m$ matrix cannot be one-to-one.