Math 40 - Section —
HW 7 - Linear Transformations and Determinants
Tuesday, February 9, 2016

3.6.{6, 10, 20, 54}, 4.2.{8, 33}

3.6.6 Prove that the given transformation is a linear transformation, using the definition (or the Remark following Example 3.55):

$$T\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} x+z \\ y+z \\ x+y \end{bmatrix}.$$

$\blacksquare$

3.6.10 Give a counterexample to show that the given transformation is not a linear transformation:

$$T \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} x+1 \\ y-1 \end{bmatrix}.$$

■

3.6.20 Find the standard matrix of the linear transformation from $\mathbb{R}^2$ to $\mathbb{R}^2$ which performs a counterclockwise rotation through 120^o about the origin.

$\blacksquare$

3.6.54 Prove that (as noted at the beginning of this section) the range of a linear transformation $T : \mathbb{R}^n \mapsto \mathbb{R}^m$ is the column space of its matrix $[T]$.

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4.2.8 Compute the determinant of the following matrix using cofactor expansion along any row or column that seems convenient.

$$\begin{vmatrix} 1 & 1 & -1 \\ 2 & 0 & 1 \\ 3 & -2 & 1 \end{vmatrix}$$

■

4.2.33 Use properties of determinants to evaluate the determinant by inspection. Explain your reasoning.

$$\begin{vmatrix} 0 & 2 & 0 & 0 \\ -3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 4 \\ 0 & 0 & 1 & 0 \end{vmatrix}$$

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