MATH 320, Spring 2013, Assignment 8

Textbook Questions

Section 4.1 Determine whether given vectors $\vec{u}$, $\vec{v}$, and $\vec{w}$ are linearly independent or dependent. If they are linearly dependent, find scalars a, b, and c not all zero such that $a\vec{u} + b\vec{v} + c\vec{w} = \vec{0}$.

 # 21 $\vec{u} = (1, 1, -2)$, $\vec{v} = (-2, -1, 6)$, $\vec{w} = (3, 7, 2)$

 # 24 $\vec{u} = (1, 4, 5)$, $\vec{v} = (4, 2, 5)$, $\vec{w} = (-3, 3, -1)$

Express the vector $\vec{t}$ as a linear combination of the vectors $\vec{u}$, $\vec{v}$, and $\vec{w}$.

 # 28 $\vec{t} = (7, 7, 7)$; $\vec{u} = (2, 5, 3)$, $\vec{v} = (4, 1, -1)$, $\vec{w} = (1, 1, 5)$

Section 4.3 Express the indicated vector $\vec{w}$ as a linear combination fo the given vectors $\vec{v}_1, \vec{v}_2, \ldots, \vec{v}_k$ if this is possible. If not show that it is impossible.

 # 13 $\vec{w} = (5, 2, -2)$; $\vec{v}_1 = (1, 5, -3)$, $\vec{v}_2 = (5, -3, 4)$

 # 16 $\vec{w} = (7, 7, 9, 11)$; $\vec{v}_1 = (2, 0, 3, 1)$, $\vec{v}_2 = (4, 1, 3, 2)$, $\vec{v}_3 = (1, 3, -1, 3)$

Section 4.4 Determine whether the following vectors represent a basis of $\mathbb{R}^n$.

 # 2 $\vec{v}_1 = (3, -1, 2)$, $\vec{v}_2 = (6, -2, 4)$, $\vec{v}_3 = (5, 3, -1)$

 # 8 $\vec{v}_1 = (2, 0, 0, 0)$, $\vec{v}_2 = (0, 3, 0, 0)$, $\vec{v}_3 = (0, 0, 7, 6)$, $\vec{v}_4 = (0, 0, 4, 5)$

Find a basis for the solution space of the given homogeneous linear system (i.e. find the null space).

 # 20

$$\begin{aligned} x_1 - 3x_2 - 10x_3 + 5x_4 &= 0 \\ x_1 + 4x_2 + 11x_3 - 2x_4 &= 0 \\ x_1 + 3x_2 + 8x_3 - x_4 &= 0 \end{aligned}$$

Section 4.5 Find both a basis for the row space and a basis for the column space of the given matrix A.

 # 6 $\begin{bmatrix} 1 & 4 & 9 & 2 \\ 2 & 2 & 6 & -3 \\ 2 & 7 & 16 & 3 \end{bmatrix}$, **# 12** $\begin{bmatrix} 1 & 1 & 3 & 3 & 0 \\ -1 & 0 & -2 & -1 & 1 \\ 2 & 3 & 7 & 8 & 1 \\ -2 & 4 & 0 & 6 & 7 \end{bmatrix}$