Math 54 Section 4: Quiz 1

Problem 1 (Ch. 1.5, # 32) Could a set of 3 vectors in $\mathbb{R}^4$ span all of $\mathbb{R}^4$? Explain. What about n vectors in $\mathbb{R}^m$ where n is less than m?

Problem 2 (Ch. 1.7 # 22) True or False. If False, give a counter-example.

(a) If u and v are linearly independent and if w is in Span$\{u, v\}$, then $\{u, v, w\}$ is linearly independent.

(b) If 3 vectors in $\mathbb{R}^3$ lie in the same plane in $\mathbb{R}^3$, then they are linearly independent.

(c) If a set contains fewer vectors than there are entries in the vectors, then the set is linearly independent.

(d) If a set in $\mathbb{R}^n$ is linearly dependent, then the set contains more than n vectors.

Problem 3 Determine by inspection whether the following vectors are linearly independent.

1. $\begin{bmatrix} 3 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 5 \end{bmatrix}, \begin{bmatrix} 40 \\ -2 \end{bmatrix}$
2. $\begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 5 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 14 \end{bmatrix}$
3. $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 4 \\ 5 \\ 4 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$

Problem 4 Solve the equation $Ax = 0$ with

$$A = \begin{bmatrix} -2 & -2 & 4 \\ 4 & 3 & -5 \\ -2 & -3 & 7 \end{bmatrix}$$

(Hint: Try adding columns together instead of doing row reduction.)