

Name (Print): _____

Problem 1 (3 points). Let A be an $m \times n$ matrix. Determine whether the following statements are True or False:

1. _____ The columns of the matrix A are linearly independent if and only if the equation $A\mathbf{x} = \mathbf{0}$ has a solution.
2. _____ The columns of the matrix A are linearly independent if and only if every column of A is a pivot column.
3. _____ If A is an 3×4 matrix, then the columns of A are linearly dependent.
4. _____ If $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3, \mathbf{v}_4$ are in \mathbb{R}^4 and $\mathbf{v}_4 = \mathbf{v}_1 - \mathbf{v}_3$, then $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3, \mathbf{v}_4\}$ is linearly dependent.
5. _____ The vectors $\begin{bmatrix} 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ are linearly independent.
6. _____ The vectors $\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} -2 \\ -4 \\ 6 \end{bmatrix}$ are linearly dependent.

Problem 2 (2 points). Find all values of h for which the columns of the following matrix are linearly dependent.

$$A = \begin{pmatrix} 0 & 8 & 7 \\ 3 & 7 & -4 \\ -1 & -5 & h \end{pmatrix}$$