Math 40 Subspaces, Basis, Dimension, and Rank Tuesday, February 9, 2016

3.5.{12, 18, 20, 46, 48, 58}

**3.5.12** Determine whether **b** is in col(A) and whether **w** is in row(A), as in Example 3.41.

$$A = \begin{bmatrix} 1 & 1 & -3 \\ 0 & 2 & 1 \\ 1 & -1 & -4 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \mathbf{w} = \begin{bmatrix} 2 & 4 & -5 \end{bmatrix}$$

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**3.5.18** Give bases for row(A), col(A), and null(A).

$$A = \begin{bmatrix} 1 & 1 & -3 \\ 0 & 2 & 1 \\ 1 & -1 & -4 \end{bmatrix}$$

**3.5.20** Give bases for row(A), col(A), and null(A).

$$A = \begin{bmatrix} 2 & -4 & 0 & 2 & 1 \\ -1 & 2 & 1 & 2 & 3 \\ 1 & -2 & 1 & 4 & 4 \end{bmatrix}$$

**3.5.46** Answer Exercises 45 - 48 by considering the matrix with the given vectors as its columns. Do  $\begin{bmatrix} 1 \\ -1 \\ 3 \end{bmatrix}$ ,  $\begin{bmatrix} -1 \\ 5 \\ 1 \end{bmatrix}$ , form a basis for  $\mathbb{R}^3$ ?

**3.4.48** Answer Exercises 45 - 48 by considering the matrix with the given vectors as its columns. Do  $\begin{bmatrix} 1 \\ -1 \\ 0 \\ 0 \end{bmatrix}$ ,  $\begin{bmatrix} 0 \\ 1 \\ 0 \\ -1 \end{bmatrix}$ ,  $\begin{bmatrix} 0 \\ 0 \\ -1 \\ 1 \end{bmatrix}$  form a basis for  $\mathbb{R}^4$ ?

**3.5.58** If *A* and *B* are  $n \times n$  matrices of rank *n*, prove that *AB* has rank *n*.