

Math 196-47, Mr. Church, Homework 7
Due at the beginning of class on Wednesday, May 6.
Please staple your homework.

1. (a) Are the vectors

$$\left\{ \begin{bmatrix} -1 \\ 2 \\ 0 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ -1 \\ -1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 1 \\ 0 \\ -1 \\ 0 \end{bmatrix} \right\}$$

a basis for \mathbb{R}^5 ?

- (b) Are the vectors

$$\left\{ \begin{bmatrix} -1 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \right\}$$

a basis for \mathbb{R}^3 ?

2. For each of the following matrices, find a basis for the row space, the column space, and the null space, and write down the dimension of each of these subspaces.

- (a)

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

- (b)

$$B = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & 1 \\ 5 & 5 & 5 \end{bmatrix}$$

- (c)

$$C = \begin{bmatrix} 1 & 4 & 0 \\ 5 & 0 & 5 \\ 1 & 8 & -1 \end{bmatrix}$$

- (d)

$$D = \begin{bmatrix} 2 & 1 & 1 & 1 \\ 1 & 1 & 2 & 2 \\ 1 & 2 & 3 & 0 \end{bmatrix}$$

- (e)

$$E = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ 1 & 0 \\ 2 & 0 \end{bmatrix}$$