

## Math 22 Spring 2016, Homework 1, due Wednesday, April 6

*Instructions:* Write your answers neatly and clearly on straight-edged paper, use complete sentences, and label any diagrams. List problems in numerical order and staple all pages together. Start each problem on a new page. Please show your work; no credit is given for solutions without work or justification. If you are not sure what you are allowed to assume for a problem, ask!

1. (5 points) Consider the system of linear equations

$$\begin{cases} 4x_1 - 2x_2 + x_3 = 9 \\ 3x_2 - x_3 = -\frac{11}{2} \\ -x_1 + 2x_3 = 7 \end{cases} .$$

- (a) Give the augmented matrix for the system.  
(b) Find the solution set of the system using any (non-computer) method.

2. (5 points) Consider the system of linear equations

$$\begin{cases} -x_1 + 2x_3 - 8x_4 = 4 \\ -4x_1 + x_2 + 2x_3 - 7x_4 = 21 \\ -5x_1 - 6x_4 = 10 \\ -x_1 - x_2 - 2x_3 + x_4 = -11 \end{cases} .$$

- (a) Compute an echelon form and identify the pivot columns.  
(b) Using only the information from part (a), is the system consistent? How do you know?

3. (5 points) Is  $\mathbf{b} = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$  a linear combination of the vectors  $\begin{bmatrix} -3 \\ -4 \\ 2 \end{bmatrix}$ ,  $\begin{bmatrix} -1 \\ -4 \\ 1 \end{bmatrix}$ , and  $\begin{bmatrix} 2 \\ -6 \\ 0 \end{bmatrix}$ ?

4. (5 points) For what value(s) of  $a$  is  $\begin{bmatrix} 1 \\ a \\ 0 \end{bmatrix}$  in  $\text{Span} \left\{ \begin{bmatrix} 4 \\ -2 \\ 2 \end{bmatrix}, \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 8 \\ -4 \\ 0 \end{bmatrix} \right\}$ ?