

Name KEY  
 Math 268, Quiz #2, Spring 2012

**Instructions:** Show all work. You may use your calculator to check your work but answers only will be awarded no credit. Questions that require a verbal response should be answered as completely as possible.

1. Rewrite the following system of equations in a) an augmented matrix form, b) vector equation form, c) matrix equation form.

$$\begin{cases} 5x_1 - x_2 + 2x_3 = 7 \\ -2x_1 + 6x_2 + 9x_3 = 0 \\ -7x_1 + 5x_2 - 3x_3 = -7 \end{cases}$$

Augmented  

$$\left[ \begin{array}{ccc|c} 5 & -1 & 2 & 7 \\ -2 & 6 & 9 & 0 \\ -7 & 5 & -3 & -7 \end{array} \right]$$

vector  

$$x_1 \begin{bmatrix} 5 \\ -2 \\ -7 \end{bmatrix} + x_2 \begin{bmatrix} -1 \\ 6 \\ 5 \end{bmatrix} + x_3 \begin{bmatrix} 2 \\ 9 \\ -3 \end{bmatrix} = \begin{bmatrix} 7 \\ 0 \\ -7 \end{bmatrix}$$

matrix  $\rightarrow$   

$$\begin{bmatrix} 5 & -1 & 2 \\ -2 & 6 & 9 \\ -7 & 5 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 7 \\ 0 \\ -7 \end{bmatrix}$$

2. Row reduce the system  $A\vec{x} = \vec{b}$  given by  $\begin{cases} 2x_1 + 2x_2 + 4x_3 = 8 \\ -4x_1 - 7x_2 - 11x_3 = -4 \\ -3x_2 - 3x_3 = 12 \end{cases}$ . State the solution to the

system in parametric form (if needed). State the size of the space spanned by  $A\vec{x} = \vec{0}$ .

$$\begin{bmatrix} 1 & 0 & 1 & 8 \\ 0 & 1 & 1 & -4 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \begin{aligned} x_1 &= -x_3 + 8 \\ x_2 &= -x_3 - 4 \\ x_3 &= x_3 \end{aligned} \quad \rightarrow \vec{x} = \begin{bmatrix} -1 \\ -1 \\ 1 \end{bmatrix} x_3 + \begin{bmatrix} 8 \\ -4 \\ 0 \end{bmatrix}$$

Space spanned by  $A\vec{x} = \vec{0} \Rightarrow \vec{x} = \begin{bmatrix} -1 \\ -1 \\ 1 \end{bmatrix} x_3$

$\Rightarrow \mathbb{R}^1$

(space spanned by  $A$  is  $\mathbb{R}^2$ , but that's not what I asked)