## M 340L - CS Homework Set 5

1. Either show that the vectors  $\begin{bmatrix} 0\\2\\3 \end{bmatrix}, \begin{bmatrix} 0\\0\\-8 \end{bmatrix}, \begin{bmatrix} 1\\3\\-1 \end{bmatrix}$  are linearly independent or express one as a

linear combination of the others.

2. Either show that the columns of the matrix 
$$\begin{bmatrix} -4 & -3 & 0 \\ 0 & -1 & 5 \\ 1 & 2 & -5 \\ 2 & 1 & -10 \end{bmatrix}$$
 are linearly independent or find a solution to the homogeneous problem

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3. Either show that the columns of the matrix 
$$\begin{bmatrix} 1 & -2 & 3 & 2 \\ -2 & 4 & -6 & 2 \\ 0 & 1 & -1 & 3 \end{bmatrix}$$
 are linearly independent or

find a solution to the homogeneous problem.

4. Find the inverses of these matrices if they exist:

a. 
$$\begin{bmatrix} 2 & 4 \\ 4 & 6 \end{bmatrix}$$

b. 
$$\begin{bmatrix} 1 & 2 & -1 \\ -4 & -7 & 3 \\ -2 & -6 & 4 \end{bmatrix}$$

5. Use the inverse found in Exercise 4a to solve the system

$$\begin{bmatrix} 2 & 4 \\ 4 & 6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

6. Mark each statement True or False. Supply a **simple counterexample** for each false statement.

- a. If A is invertible, then the inverse of  $A^{-1}$  is A itself.
- b. A product of invertible  $n \times n$  matrices is invertible, and the inverse of the product is the product of their inverses in the same order.