Your name:

1. Suppose that

$$\mathbf{a}_1 = \begin{bmatrix} 1\\0\\-2 \end{bmatrix}, \quad \mathbf{a}_2 = \begin{bmatrix} -4\\3\\8 \end{bmatrix}, \quad \mathbf{a}_3 = \begin{bmatrix} 2\\5\\-4 \end{bmatrix}, \quad \text{and} \quad \mathbf{b} = \begin{bmatrix} 3\\-7\\-3 \end{bmatrix}.$$

Complete (a)–(b), and determine if **b** is a linear combination of \mathbf{a}_1 , \mathbf{a}_2 and \mathbf{a}_3 in (c).

- (a) Write the corresponding augmented matrix ${\tt C}$ in Matlab.
- C = ______(b) Find the reduced echelon form for C.
- (c) **b** _____ a linear combination of \mathbf{a}_1 , \mathbf{a}_2 and \mathbf{a}_3 .

Briefly justify your answer.

2. Let $A = \begin{bmatrix} 2 & 0 & 6 \\ -1 & 8 & 5 \\ 1 & -2 & 1 \end{bmatrix}$, and let W be the set of all linear combinations of the columns of A. Use Matlab/Octave to justify the following questions.

(a) Is
$$\mathbf{b} = \begin{bmatrix} 3\\ 3 \end{bmatrix}$$
 in W?

(b) Find a column vector \mathbf{b} (in \mathbb{R}^3) which does not belong to W.