

Name: \_\_\_\_\_

Section: \_\_\_\_\_

1. Determine whether or not the vectors  $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3, \mathbf{v}_4$  given below are linearly independent. Use row reduction.

$$\mathbf{v}_1 = (1, 0, 1, 0)$$

$$\mathbf{v}_2 = (1, -2, 1, 2)$$

$$\mathbf{v}_3 = (0, 1, 2, 1)$$

$$\mathbf{v}_4 = (3, 1, 9, 5)$$

2. For which values of  $a$ ,  $b$ , and  $c$  does the following system of equations have a solution? Use row reduction. (Hint: You should find an equation that  $a$ ,  $b$ , and  $c$  need to satisfy for the system to be consistent.)

$$\begin{cases} x + y = a \\ 2x - 3y = b \\ 4x - y = c \end{cases}$$

3. True/False: Circle the appropriate choice for each question. Circle True only if the statement is always true, and false if the statement is at least sometimes false.

True   False   If a matrix has more columns than rows, then its columns are linearly dependent.  
True   False   A set of vectors containing the zero vector can be linearly independent.