

PRINT Your Name: _____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. **CIRCLE** your answer. **CHECK** your answer whenever possible.

1. Solve the system of equations which corresponds to the following matrix:

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 4 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 0 \end{array} \right].$$

$$x_1 = 4 - 2x_2$$

$$x_3 = 5$$

x_2 is arbitrary

2. Solve the system of equations which corresponds to the following matrix:

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 4 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 3 \end{array} \right].$$

No solution

3. Are the vectors $v_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, and $v_2 = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$ linearly independent or linearly dependent? Explain!!

They are **linearly dependent** because $-2 \begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 2 \\ 4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$

4. Are the vectors $v_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, $v_2 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, and $v_3 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ linearly independent or linearly dependent? Explain!!

They are **linearly independent**. \neq

$$x_1 \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} + x_2 \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} + x_3 \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \text{ then row 3 says } x_3 = 0,$$

row 2 says $x_2 + x_3 = 0$ (hence $x_2 = 0$) and row 1 says

$$x_1 + x_2 + x_3 = 0 \text{ (hence } x_1 = 0).$$