

Instructions: Clearly answer each of the questions below. Remember to check the back side. Show your work and any formulas you employ. Simplify all answers as far as possible.

1. (2pts) If $\mathbf{v} = [9, -1]$ and $\mathbf{w} = [4, 6]$, then the linear combination $5\mathbf{v} - 2\mathbf{w} =$ $[37, -17]$

2. (2pts) True or False:

(a)

$$\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} \in \text{span} \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \right\}$$

 True

(b)

$$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \in \text{span} \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \right\}$$

 False

3. (1pt) How many free variables will there be in the solution of the linear system represented by the augmented matrix

$$\begin{bmatrix} 0 & 1 & 7 & -5 & -2 & 1 & -1 & 1 & -5 \\ 0 & 0 & 0 & 0 & 1 & 3 & 2 & 4 & -3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 & 18 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 9 \end{bmatrix}$$

 5 free variables

4. (3pts) Find the unique solution of the linear system corresponding to this augmented matrix.

$$\begin{bmatrix} 1 & -12 & 0 & -32 \\ 0 & 3 & -1 & -1 \\ 0 & 0 & 1 & 7 \end{bmatrix}$$

$$\underline{\underline{x_1 = -8}}$$

$$\underline{\underline{x_2 = 2}}$$

$$\underline{\underline{x_3 = 7}}$$