LAFDS Session 2 Homework

Full Name: _____

Group No.: ____

Please write down all the steps not the final answer only

Questions:

1. Determine whether the vector $\mathbf{x_1}$ = (2; 1; 3) lies in the span of the vectors $\mathbf{x_2}$ = (1; 2; 3) and $\mathbf{x_3}$ = (2; 3; 1).

2. Express the vector "**w**" as a linear combination of the given vectors vi

   - $\mathbf{v_1} = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$, $\mathbf{w} = \begin{bmatrix} -8 \\ 12 \end{bmatrix}$
   - $\mathbf{v_1} = \begin{bmatrix} 2 \\ 0 \\ 5 \end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix}$, $\mathbf{w} = \begin{bmatrix} 4 \\ -6 \\ 10 \end{bmatrix}$

3. Match each set of vectors with their corresponding span

1. $\mathbf{v1} = \begin{bmatrix} 3 \\ 6 \end{bmatrix}$ 2. $\mathbf{v1} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, $\mathbf{v2} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ 3. $\mathbf{v1} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ 4. $\mathbf{v1} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, $\mathbf{v2} = \begin{bmatrix} -1 \\ 5 \end{bmatrix}$ 5. $\mathbf{v1} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, $\mathbf{v2} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ 6. $\mathbf{v1} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$, $\mathbf{v2} = \begin{bmatrix} 2 \\ 6 \end{bmatrix}$	a) The span is the line y = 1/2 x b) The span is the single point (0;0) c) The span is the line y = 3x. d) The span is all of $\mathbb{R}^2$. e) The span is the line y = 2x. f) The span is all of $\mathbb{R}^2$

4. (2 points) Let S = {$\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$, $\mathbf{v_4}$, $\mathbf{v_5}$} where,

$\mathbf{v_1} = \begin{bmatrix} 1 \\ 2 \\ 2 \\ -1 \end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix} 1 \\ 3 \\ 1 \\ 1 \end{bmatrix}$, $\mathbf{v_3} = \begin{bmatrix} 1 \\ 5 \\ -1 \\ 5 \end{bmatrix}$, $\mathbf{v_4} = \begin{bmatrix} 1 \\ 1 \\ 4 \\ -1 \end{bmatrix}$, $\mathbf{v_5} = \begin{bmatrix} 2 \\ 7 \\ 0 \\ 2 \end{bmatrix}$

Find a basis for the span Span(S).

5. Find the solution set of the following systems of linear equations.

a)
$$\begin{aligned} x_1 + 4x_2 + 3x_3 - x_4 &= 5 \\ x_1 - x_2 + x_3 + 2x_4 &= 6 \\ 4x_1 + x_2 + 6x_3 + 5x_4 &= 9 \end{aligned}$$

b)
$$\begin{aligned} x_1 + 2x_2 + 3x_3 &= 1 \\ 2x_1 - x_2 + x_3 &= 2 \\ 3x_1 + x_2 + x_3 &= 4 \\ 5x_2 + 2x_3 &= 1 \end{aligned}$$