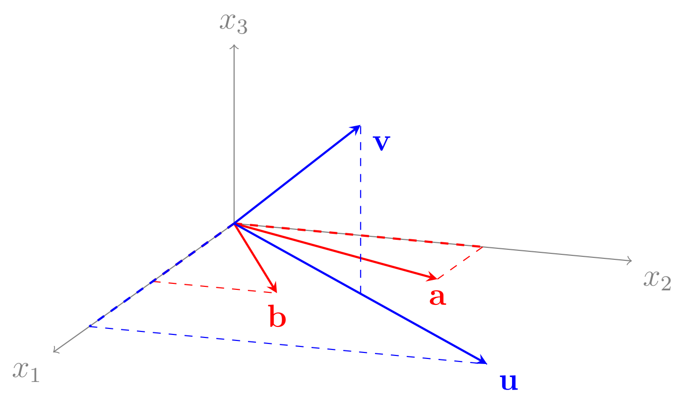
Math 2210-002/010 Quiz 4 **Name:** ____________________________ **Due:** 2/25/19

This is a two-stage quiz. You will receive this back with each question graded pass/fail in our next class meeting. You have until the date specified above to submit corrections for partial credit.

1. (2 points) Consider the vectors **a**, **b**, **u**, **v** given below.



Is $\{\mathbf{a}, \mathbf{b}, \mathbf{u}\}$ linearly independent? ____________________________

Is $\{\mathbf{a}, \mathbf{b}, \mathbf{v}\}$ linearly independent? ____________________________

2. (4 points) Consider the vectors

$$\mathbf{v_1} = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} \mathbf{v_2} = \begin{bmatrix} 1 \\ 0 \\ 6 \end{bmatrix} \mathbf{v_3} = \begin{bmatrix} 0 \\ 2 \\ 5 \end{bmatrix}.$$

Is $\{v_1, v_2, v_3\}$ linearly independent? Justify your answer.

3. (4 points) Let $A = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{bmatrix}$. Define a matrix transformation $T : \mathbb{R}^3 \to \mathbb{R}^2$ by

$$T(\mathbf{x}) = \mathbf{Ax} \text{ for each } \mathbf{x} \text{ in } \mathbb{R}^3.$$

If $\mathbf{u} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$, find the images $T(\mathbf{u})$ and $T(\mathbf{v})$ of $\mathbf{u}$ and v in $\mathbb{R}^2$.

Bonus: (4 points) If $\mathbf{e_1} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, $\mathbf{e_2} = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$ and $\mathbf{e_3} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, express $T(\mathbf{u})$ and $T(\mathbf{v})$ as linear combinations of $T(\mathbf{e_1})$, $T(\mathbf{e_2})$ and $T(\mathbf{e_3})$.

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