Problem 1. **(1 point)**

Let V be a vector, or linear space. In this class, we will most frequently use the term "vector space" rather than "linear space". Which of the following statements must be true?

- A. For every $f \in V$ and $k \in \mathbb{R}$, there is an element $kf \in V$ called the *scalar multiple* of f by k.
- B. For every $f \in V$ and $g \in V$, there is a matrix $A \in V$ whose columns are f and g.
- C. For every $f \in V$ and $g \in V$, there is an element $f \cdot g \in \mathbb{R}$ called the *dot product* of f and g.
- D. For every $f \in V$ and $g \in V$, there is an element $f \times g \in V$ called the *cross product* of f and g.
- E. For every $f \in V$ and $g \in V$, there is an element $fg \in V$ called the *product* of f and g.
- F. For every $f \in V$ and $g \in V$, there is an element $f + g \in V$ called the *sum* of f and g.

Answer(s) submitted:

- AF

submitted: (correct)
recorded: (correct)

Problem 2. **(1 point)**

Consider the vector space of all upper-triangular 2×2 matrices, with the basis $\mathfrak{B} = \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right\}$. Let $A = \begin{bmatrix} 1 & 3 \\ 0 & -3 \end{bmatrix}$. Find $[A]_{\mathfrak{B}}$.

$[A]_{\mathfrak{B}} = \begin{bmatrix} \_\_\_ \\ \_\_\_ \\ \_\_\_ \end{bmatrix}$

Answer(s) submitted:

- $\begin{bmatrix} 1 \\ 3 \\ -3 \end{bmatrix}$

submitted: (correct)
recorded: (correct)

Problem 3. **(1 point)**

Find the dimension of each of the following vector spaces.
The vector space all polynomials of degree at most 4: dimension = ___
The vector space of all polynomials of degree at most 3 having a zero constant term: dimension = ___

Answer(s) submitted:

- 5
- 3

submitted: (correct)
recorded: (correct)