Problem 1. **(1 point)**

Consider the linear transformation $T : P_2 \to P_2$ defined by $T(f) = 4f'' - 5f' + 3f$. Let $\mathfrak{B} = t^2, t, 1$, which is an ordered basis for P_2. Find the first column of the $\mathfrak{B}$-matrix of T.

Answer: first column = $\begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$

Answer(s) submitted:

- $\begin{bmatrix} 3 \\ -10 \\ 8 \end{bmatrix}$

submitted: (correct)
recorded: (correct)

Problem 2. **(1 point)**

Recall $U^{2\times 2}$, the vector space of upper triangular 2×2 matrices, and its standard basis $\mathfrak{A} = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$. Now consider instead the basis $\mathfrak{B} = \begin{bmatrix} 3 & 2 \\ 0 & -1 \end{bmatrix}, \begin{bmatrix} 5 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 8 \end{bmatrix}$. Find the change-of-basis matrix S from $\mathfrak{B}$ to $\mathfrak{A}$.

Answer: $S = \begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$.

Answer(s) submitted:

- $\begin{bmatrix} 3 & 5 & 0 \\ 2 & 0 & 0 \\ -1 & 0 & 8 \end{bmatrix}$

submitted: (correct)
recorded: (correct)

Problem 3. **(1 point)**

(Read the question carefully!) Suppose V is a linear space with two bases, $\mathfrak{B}$ and $\mathfrak{A}$, and that $T : V \to V$ is a linear transformation. Let B and A be the $\mathfrak{B}$-matrix and $\mathfrak{A}$-matrix of T respectively, and let S be the change of basis matrix from $\mathfrak{A}$ to $\mathfrak{B}$.
Which of the following statements must be true?

- A. $AS = SB$
- B. $A = S^{-1}BS$
- C. $A = SBS^{-1}$
- D. $BS = SA$
- E. $B = S^{-1}AS$
- F. $B = SAS^{-1}$

Answer(s) submitted:

- BDF

submitted: (correct)
recorded: (correct)