Problem 1. **(1 point)**

If A is a 3×3 matrix with columns $\vec{u} = a$, $\vec{v} = b$ and $\vec{w} = c$, what is the determinant of A in terms of a, b and c?
$\det(A) =$ ___ $\cdot$ (___ $\times$ ___)

Consider the matrix $A = \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 1 & 2 & 0 \end{bmatrix}$. If we apply Sarrus's rule, we calculate $\det(A) =$ (sum of three terms) $-$ (sum of three terms). For this A, what are these two sums?
$\det(A) =$ ___$-$___

Then
$\det(A) =$ ___
Answer(s) submitted:

- a
- b
- c
- 6
- 12
- -6

submitted: (correct)
recorded: (correct)

Problem 2. **(1 point)**

In the following, $\vec{v}$ and $\vec{w}$ are vectors in $\mathbb{R}^3$ and A is a 3×3 matrix. F is a function mapping from $\mathbb{R}^3 \to \mathbb{R}$ or $\mathbb{R}^{3\times 3} \to \mathbb{R}$ according to the given definitions.

Which of the following functions F are linear?

- A. $F(\vec{x}) = \det(\begin{bmatrix} \vec{v}^T \\ \vec{w}^T \\ \vec{x}^T \end{bmatrix} \begin{bmatrix} \vec{v}\,\vec{x}\,\vec{w} \end{bmatrix})$
- B. $F(A) = \det(A^T A)$
- C. $F(\vec{x}) = \det(\begin{bmatrix} \vec{v}^T \\ \vec{w}^T \\ \vec{x}^T \end{bmatrix})$
- D. $F(\vec{x}) = \det(\begin{bmatrix} \vec{v}\,\vec{x}\,\vec{w} \end{bmatrix})$
- E. $F(A) = \det(A)$

Answer(s) submitted:

- CD

submitted: (correct)
recorded: (correct)

Problem 3. **(1 point)**

Consider 4×4 matrices A and B and the following patterns from each. How many inversions are there for each pattern? What is the product for each?

(a) $P_1 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 2 \\ 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 0 \end{bmatrix}$
number of inversions = _____
product = _____

(b) $P_2 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 2 \\ 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 0 \end{bmatrix}$
number of inversions = _____
product = _____
Answer(s) submitted:

- 4
- 4
- 4
- 4

submitted: (correct)
recorded: (correct)