

Name: _____

Student ID: _____

Instructions:

1. You must show correct work to receive credit. Correct answers with inconsistent work will not be given credit.
2. Books and notes are not allowed.
3. You may use a simple calculator.
4. Turn off and put away all cell phones.

Page	Points	Points Possible
2		12
3		14
4		11
5		13
Total		50

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1. The augmented matrix of a linear system is $A = \left[\begin{array}{ccc|c} 2 & 2 & -2 & a \\ 3 & 2 & -2 & b \\ 2 & 1 & -1 & c \end{array} \right]$.

(a) (8 pts) Determine the values of a, b, c for which the system is consistent.

(b) (4 pts) If $a = 4$, $b = 1$ and $c = -1$, how many solutions does the system have?

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2. (6 pts) If A is a 4×4 matrix with $\det(A) = 3$, find $\det(4A^3A^t(2A)^{-1})$.

3. (8 pts) Let $A = \begin{bmatrix} 2 & 6 & 2 \\ 3 & 5 & 1 \\ -1 & 3 & 2 \\ 2 & 2 & 0 \end{bmatrix}$. Prove or disprove: The linear system $A\mathbf{x} = \mathbf{b}$ has a unique solution for every vector \mathbf{b} in \mathbb{R}^4 .

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4. (3 pts) Prove or disprove: If \mathbf{v} is any vector in a vector space V then $\{\mathbf{v}\}$ is linearly independent.
5. (8 pts) For which values of a is the set $S = \{ax^3, x^3 + (2a - 1)x^2, a^2x^2 + (a - 4)x\}$ linearly independent?

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6. (5 pts) Let A and B be two $n \times n$ matrices with $\det(A) = \det(B) \neq 0$. Find a matrix C such that $\det(C) = 1$ and $A = CB$.

7. (8 pts) Let V and W be subspaces of the Euclidean space \mathbb{R}^5 . Determine whether the set $S = \{\mathbf{v} - \mathbf{w} \mid \mathbf{v} \in V, \mathbf{w} \in W\}$ is a subspace of \mathbb{R}^5 .