MATH 270/GRACEY NAME______________________________

EXAM 2/Chapter 3-4.4

100 POINTS POSSIBLE

YOUR WORK MUST BE ORGANISED AND CLEAR

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1. (9 POINTS) Please circle true or false.

a. T F If A is an $n\times n$ matric and c is a nonzero scalar, then the determinant of the matrix cA is given by $nc\cdot\det(A)$.

b. T F If $\det(A)=0$, then $A\mathbf{x}=\mathbf{b}$ has a unique solution for every $\mathbf{b}$.

c. T F In general, $\det(A+B)=\det(A)+\det(B)$.

2. (15 POINTS) Determine whether the set, together with the indicated operations, is a vector space. If it is not, then identify one of the ten vector space axioms that fail.

a. (10 POINTS) $M_{1,1}$ with the standard operations.

b. (5 POINTS) The set of integers with the standard operations.

3. (10 POINTS) Use a determinant to find the equation of the plane passing through $(3,1,-1),(-2,4,7),$ and $(0,3,2)$.

4. (10 POINTS) If possible, write $\mathbf{v}$, as a linear combination of $\mathbf{u}_1$ and $\mathbf{u}_2$.

$$\mathbf{v} = (-2,6,6)$$
$$\mathbf{u}_1 = (1,2,-2)$$
$$\mathbf{u}_2 = (2,-1,1)$$

5. (6 POINTS) Complete the following definition:

A nonempty subset W of a vector space V is called a subspace of V when W is

6. (10 POINTS) Use Cramer's Rule to solve the linear system. **<u>No graphing calculator—show all steps for full credit</u>**.

$$\begin{aligned} 5x - y &= 3 \\ 2x + 3y &= 7 \end{aligned}$$

7. (10 POINTS) Determine whether the set S spans R^3.

$S = \{(1,0,1),(1,1,0),(0,1,1)\}$

8. (20 POINTS) Consider the following matrices. **<u>Do not use a graphing calculator—show all steps for full credit</u>**.

$$A = \begin{bmatrix} -1 & 1 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} -3 & 4 \\ 6 & 1 \end{bmatrix}$$

a. (4 POINTS) Find $\det(A)$.

d. (4 POINTS) Find $\det(A^T)$.

b. (4 POINTS) Find $\det(B)$.

e. (4 POINTS) Find $\det(AB)$

c. (4 POINTS) Find $\det(A^{-1})$.

9. (10 POINTS) Determine whether the set of vectors in $M_{2,2}$ is linearly independent or linearly dependent.

$$A=\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}, B=\begin{bmatrix}0 & 1\\0 & 0\end{bmatrix}, C=\begin{bmatrix}0 & 0\\1 & 0\end{bmatrix}$$