MA 322 - Matrix Algebra Fall 2009
Practice Exam 2 10/28/2009

Name: _____

Answer all of the following questions. Use the backs of the question papers for scratch paper. No books or notes nor calculators may be used. When answering the questions, please be sure to:

- check answers when possible,
- clearly indicate your answer and the reasoning used to arrive at that answer (*unsupported answers to Questions 1 - 5 may receive NO credit*).

QUESTION	SCORE	TOTAL
1.		20
2.		15
3.		15
4.		20
5.		20
6.		10
TOTAL		100

1. Let $A = \begin{bmatrix} 1 & 0 & -2 \\ -8 & 1 & 2 \\ 9 & -2 & 45 \end{bmatrix}$. Compute the inverse of A if it exists.

2. Find the determinant of the matrix $A = \begin{bmatrix} 4 & 0 & 0 & -2 \\ 0 & -2 & 1 & 0 \\ 0 & 7 & 8 & 9 \\ 0 & 3 & -2 & 0 \end{bmatrix}$.

3. Let $A = \begin{bmatrix} 1 & 3 & 3 \\ 3 & 9 & 9 \\ 2 & 6 & 5 \end{bmatrix}$. Find a basis of Nul A.

4. Consider the set $H = \text{Span}\{v_1, v_2, v_3\}$ where $v_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, $v_2 = \begin{bmatrix} 5 \\ 7 \\ 15 \end{bmatrix}$ $v_3 = \begin{bmatrix} 4 \\ 2 \\ 12 \end{bmatrix}$. Find a basis of H.

5. Argue whether the following sets are vector spaces:
(a) The set of functions $f : \mathbb{R} \to \mathbb{R}$ such that $f(5) = 1$.
(b) The set of $m \times n$ matrices.

6. Decide if the following statements are true or false by checking the corresponding box.

true	false	
☐	☐	If one entry of a square matrix is zero then the matrix is not invertible.
☐	☐	If the columns of an $n \times n$ matrix span $\mathbb{R}^n$ then its determinant is not zero.
☐	☐	The set of differentiable functions $f : \mathbb{R} \to \mathbb{R}$ with $f(0) = 0$ forms a vector space.
☐	☐	In $\mathbb{R}^n$ every set of less than n vectors is linearly independent.
☐	☐	If the the columns of the $n \times n$ matrix A span $\mathbb{R}^n$, then every subset of the columns of A is linearly independent.