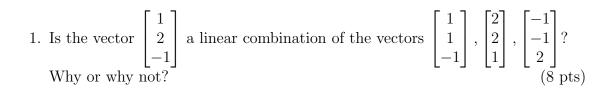
Math 3333 Spring 2015 Midterm 1

Name:___

Problem	Points
Problem 1 (8pts)	
Problem 2 (12pts)	
Problem 3 (24pts)	
Problem 4 (24pts)	
Problem 5 (12pts)	
Problem 6 (22pts)	
Total	



2. Suppose A and B are $n \times n$ matrices and that A is symmetric and B is skew symmetric. Determine if AB is symmetric, skew symmetric, both, or neither.

Either give a proof (if your answer is symmetric, skew symmetric, or both), or find an example which shows that AB can be neither. (12 pts)

3. Let
$$A = \begin{bmatrix} 0 & 1 & 2 & 0 \\ 0 & 5 & 0 & -1 \\ 2 & 0 & 3 & 4 \\ 0 & -1 & 1 & 0 \end{bmatrix}$$
. Compute the following determinants. (24 pts)
(a) det(A)

(b) $\det(2A^{-1})$

(c) $\det(A^T A)$

(d) $\det(A^T - A)$

4. Let
$$A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 6 \\ 1 & 1 & 4 \end{bmatrix}$$
.
(a) Find A^{-1} or show that A is not invertible. (12 pts)

(b) Use your answer to part (a) to find the solutions to $A^2 \mathbf{x} = \mathbf{b}$ where $\mathbf{b} = \begin{bmatrix} 0\\1\\1 \end{bmatrix}.$ (12 pts)

- 5. Suppose A is a 4×3 matrix and that the linear system $A\mathbf{x} = \mathbf{b}$ has exactly one solution for some 4-vector \mathbf{b} .
 - (a) If possible, find the RREF of A. Otherwise describe what can be said about the RREF of A from the given information. (6 pts)

(b) If **c** is another 4-vector, what are the possible numbers of solutions to the linear system $A\mathbf{x} = \mathbf{c}$? (6 pts)

6. Consider the linear system:

$$-a - 2b + d - 2e = 2$$
$$a + 2b + 3c - 5d + 15e = -11$$
$$2a + 4b + c - d + 6e = 7$$

(a) Find the augmented matrix of the linear system. (6 pts)

(b) One of the following is the reduced row echelon form (RREF) of the augmented matrix. Circle it.

(8 pts)

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(c) Find all solutions to the linear system. Write your answer as a vector. (8 pts)