NAME:

Group Number:

244 First Midterm, March 2013

- I) Choose the correct answer:
 - (a) If A, B, C are square matrices of the same size, then

$$(A - B)(C - A) + (C - B)(A - C) + (C - A)^{2}$$

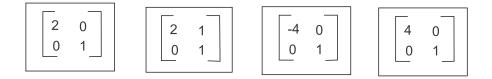
equals

(b) If A and B are 3×3 invertible square matrices and

$$\det[2A^{-1}] = \det[A^3(B^{-1})^T] = -4,$$

then

$$\begin{bmatrix} \det(A)=4 \\ \det(B)=4 \end{bmatrix} \qquad \begin{bmatrix} \det(A)=-4 \\ \det(B)=4 \end{bmatrix} \qquad \begin{bmatrix} \det(A)=2 \\ \det(B)=-2 \end{bmatrix} \qquad \begin{bmatrix} \det(A)=-2 \\ \det(B)=-2 \end{bmatrix}$$
(c) If $A^3 - 2B^T = \begin{bmatrix} 18 & -2 \\ -6 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -5 & 3 \\ 1 & 0 \end{bmatrix}$, then the matrix A is



- II) Decide if the following statements are true (T) or false (F). Justify your answer.
 - (a) If A and B are two matrices, such that $A \cdot B = O$, then either A = O or B = O.



(b) If A and B are square matrices of the same size, such that A + B is symmetric, then both A and B are symmetric.



(c) If A is a $n \times n$ square matrix, n > 1 and $k \in \mathbb{R}, k \neq 0, k \neq \pm 1$, then $\det[kA] = k \cdot \det[A]$.

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III) Let
$$A = \begin{bmatrix} 2 & 3 & -5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{bmatrix}$$
.
(a) Find det[A];
(b) Find adj [A];
(c) Find A^{-1} ;
 $\begin{bmatrix} x_1 \end{bmatrix}$

(d) Solve the system
$$A\mathbf{x} = \mathbf{b}$$
, where $\mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} -1 \\ 0 \\ 2 \end{bmatrix}$.

IV) Find a, such that the matrix $A = \begin{bmatrix} 1 & a & a \\ a & 1 & a \\ a & a & 1 \end{bmatrix}$ is **not** invertible.