Practice Midterm 1, MA 265 Section: Fall 2014

Name:

PUID:

Exam A:

No calculators may be used on this exam.

Problem Number	Possible Points	Points Earned
I	60pts	
II	20pts	
III	20pts	
Total Points	100pts	

I

Answer the following questions by clearly circling your answers. No partial credit is awarded for the questions in part I.

(1) Which of the expressions below equals $(\mathbf{A} \cdot \mathbf{B} \cdot \mathbf{C})^{-1}$

(a) $\mathbf{A}^{-1} \cdot \mathbf{B}^{-1} \cdot \mathbf{C}^{-1}$
(b) $\mathbf{A}^{-1} \cdot \mathbf{C}^{-1} \cdot \mathbf{B}^{-1}$
(c) $\mathbf{C}^{-1} \cdot \mathbf{A}^{-1} \cdot \mathbf{B}^{-1}$
(d) $\mathbf{C}^{-1} \cdot \mathbf{B}^{-1} \cdot \mathbf{A}^{-1}$

(2) Which of the expression below correspond to the determinant of the matrix

$$7 \cdot \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ 0 & a_{22} & a_{23} \\ 0 & 0 & a_{33} \end{pmatrix}$$

(a) $a_{11}a_{22}a_{33}$
(b) $7a_{11}a_{22}a_{33}$
(c) $7^2a_{11}a_{22}a_{33}$
(d) $7^3a_{11}a_{22}a_{33}$

(3) Let V denote the vector space of 3×3 matrices endowed with the usual matrix addition and the usual product of matrices with numbers. Which ones of the subsets of V below are not subspaces of V? (circle all that apply)

(a) The set of diagonal 3×3 matrices.
(b) The set of 3×3 matrices for which $\det(\mathbf{A}) \neq 0$.
(c) The set of 3×3 matrices for which $\det(\mathbf{A}) = 0$
(d) The set of 3×3 matrices for which $\mathbf{A}^2 = -\mathbf{I}_3$
(e) The set of 3×3 matrices for which $\mathbf{A} \cdot \mathbf{A}^T = \mathbf{I}_3$

(4) Which statements below about matrices are true (circle all that apply)

(a) Matrices of different sizes can sometimes be added to each other
(b) For every 3×3 matrices $\mathbf{A} \cdot \mathbf{B} = \mathbf{B} \cdot \mathbf{A}$
(c) Let $\mathbf{B}$ denote the matrix which result from interchanging the first and the second row of $\mathbf{A}$. Then it must follow that $\det(\mathbf{A}) \neq \det(\mathbf{B})$.
(d) The product of two diagonal matrices always results in a diagonal matrix.

(5) Which of the statement above are true for the matrix $\mathbf{A}$ below (circle all that apply)

$$\mathbf{A} = \frac{\sqrt{2}}{2} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$$

(a) $\mathbf{A}$ is symmetric
(b) $\mathbf{A}$ is skew-symmetric.
(c) $\mathbf{A}^T \cdot \mathbf{A} = \mathbf{I}_2$
(d) $\mathbf{A}^2 = \mathbf{I}_2$.

(6) What is the value of the determinant of the matrix

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 3 \\ 2 & 4 & 5 & 1 & 6 \\ 3 & 5 & 1 & 9 & 9 \\ 4 & 4 & 6 & 8 & 12 \\ 5 & 4 & 5 & 6 & 15 \end{pmatrix}$$

(a) 7
(b) -3
(c) 0
(d) 1

II

Use the reduced row echelon method to compute $\mathbf{A}^{-1}$ for

$$\mathbf{A} = \begin{pmatrix} 4 & 5 & 1 \\ 1 & 0 & 0 \\ 1 & 3 & 3 \end{pmatrix}$$

Answer:

III(20pts)

(a) Use Cramer's rule to find the solution to the system of equation

$$\begin{cases} x_1 + 2x_2 + 3x_3 & = & 1 \\ x_1 + 4x_2 + 9x_3 & = & 0 \\ x_1 + 8x_2 + 27x_3 & = & -1 \end{cases}$$