

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 bellow 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 bellow correspond to the determinant of the matrix

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

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

(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  $3 \times 3$  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)  $\mathbf{A}^2 = \mathbf{I}$ .

(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

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

