

Practice Midterm 1, MA 265 Section: Spring 2015

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 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) $\mathbf{C}^{-1} \cdot \mathbf{B}^{-1} \cdot \mathbf{A}^{-1}$
- (e) $\mathbf{B}^{-1} \cdot \mathbf{A}^{-1} \cdot \mathbf{C}^{-1}$

(2) For a nonsingular $n \times n$ matrix \mathbf{A} , the determinant of the adjoint matrix $\text{adj}(\mathbf{A})$ is

- (a) $\det(\mathbf{A})$
- (b) $\det(\mathbf{A}^n)$
- (c) $\det(\mathbf{A}^{n-1})$
- (d) $\det(\mathbf{A}^{n+1})$
- (e) $\det(\mathbf{A}^{-1})$

(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 $\mathbf{A}^2 = -\mathbf{I}$
- (e) The set of 3×3 matrices for which $\mathbf{A} \cdot \mathbf{A}^T = \mathbf{I}$

(4) Which statements below 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 necessary follows that $\det(\mathbf{A}) \neq \det(\mathbf{B})$.
- (d) The product of two diagonal matrices always results in a diagonal matrix.
- (e) The product of an $m \times 1$ matrix by a $1 \times n$ results in a $n \times m$ 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 skewsymmetric.
- (c) $\mathbf{A}^T \cdot \mathbf{A} = \mathbf{I}_2$
- (d) $\mathbf{A}^2 = \mathbf{I}$.
- (d) $\mathbf{A}^{-1} = \mathbf{A}^3$.

(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) 4
- (e) 1

II

Use the reduced row echelon method to compute the inverse of the matrix **A**.

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

Answer:

III(20pts)

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

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

