

Math 204, Class test, October 23, 2016

Course Examiner: A. Kokotov

Instructors: I. Chinis, H. Brandes, L. Dube, R. Mearns

Time: 1 Hour and 30 minutes

Answer all questions. **Only approved calculators are allowed**

1. **(10 points)** Using Gauss-Jordan method solve the following system:

$$\begin{cases} 2x_1 + x_2 + x_3 + x_4 = 7 \\ x_1 + 2x_2 + 2x_3 + x_4 = 8 \\ 4x_1 + 3x_2 + 3x_3 + 3x_4 = 19 \end{cases}$$

2. **(10 points)**

(A) Find

$$\begin{pmatrix} 2 & 3 & 7 \\ 3 & 5 & 11 \\ 1 & 2 & 3 \end{pmatrix}^{-1}$$

(B) Solve the following equation for matrix X :

$$\begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix} X \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 2 & 1 \end{pmatrix}$$

3. **(10 points)** Compute the determinant

$$\begin{vmatrix} 3 & -3 & -5 & 8 \\ -3 & 2 & 4 & -6 \\ 2 & -5 & -7 & 5 \\ -4 & 3 & 5 & -6 \end{vmatrix}$$

4. **(10 points)** Solve using Cramer's rule:

$$\begin{cases} 2x - y + 3z = 9 \\ 3x - 5y + z = -4 \\ 4x - 7y + z = 5 \end{cases}$$

5. **(10 points)** For

$$A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 5 & 6 \\ 2 & 4 & 5 \end{pmatrix}$$

compute

$$(a_{11} + 5a_{21})C_{11} + (a_{12} + 5a_{22})C_{12} + (a_{13} + 5a_{23})C_{13}.$$

6. **(10 points)** Determine the values of a for which the system has no solutions, exactly one solution, or infinitely many solutions

$$\begin{cases} x + ay + (a^2 - 1)z = 2a \\ x + ay = a + 1 \\ ay + (a^2 - 1)z = 2a - 1 \end{cases}$$