MIDTERM 7 Winter 2017, questions

Vectors and Matrices (Concordia University)

Math 204, Class test, March 5, 2017

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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:

$$\begin{cases} 2x_1 - 3x_2 + 5x_3 + 7x_4 = 1 \\ 4x_1 - 6x_2 + 2x_3 + 3x_4 = 2 \\ 2x_1 - 3x_2 - 11x_3 - 15x_4 = 1 \end{cases}$$

2. **(10 points)**

   (A) Find

   $$\begin{pmatrix} 2 & 5 & 7 \\ 6 & 3 & 4 \\ 5 & -2 & -3 \end{pmatrix}^{-1}$$

   (B) Solve the following equation for matrix X:

   $$\begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix} X \begin{pmatrix} 1 & 2 \\ 3 & 7 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 2 & 2 \\ 1 & 1 \end{pmatrix}$$

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

$$\begin{vmatrix} -3 & 9 & 3 & 6 \\ -5 & 8 & 2 & 7 \\ 4 & -5 & -3 & -2 \\ 7 & -8 & -4 & -5 \end{vmatrix}$$

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

$$\begin{cases} x + y + z = 0 \\ x + 2y + 2z = 3 \\ 3x + 4y + 5z = 0 \end{cases}$$

5. **(10 points)** For

$$A = \begin{pmatrix} 11 & 23 & 32 \\ 25 & 57 & 69 \\ 82 & 94 & 53 \end{pmatrix}$$

compute

$$a_{12}C_{12} + a_{13}C_{13} - a_{21}C_{21} - a_{31}C_{31}$$

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

$$\begin{cases} ax + y + z = 1 \\ x + ay + z = 1 \\ x + y + az = 1 \end{cases}$$

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