# Math 204 Midterm (Fall 2020)

Vectors and Matrices (Concordia University)

# Math 204, Class test, October 25, 2020

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**Time**: 75 min for the questions, plus 10 minutes additional for visual registration of the solution pages

TWO PAGES. Answer all questions. Closed book

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

$$\begin{cases} 2x_1 + 4x_2 + 5x_3 + 5x_4 = 2 \\ x_1 + x_2 + x_3 + x_4 = 1 \\ x_1 + 2x_2 + 4x_3 + 4x_4 = 1 \end{cases}$$

2. **(10 points)**

   Find the inverse matrix $A^{-1}$ for

$$A = \begin{pmatrix} 2 & 2 & 3 \\ 3 & 4 & 6 \\ 3 & 3 & 5 \end{pmatrix}$$

3. **(10 points)** Solve the following equation for matrix $X$:

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} X \begin{pmatrix} 1 & 2 \\ 2 & 5 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \\ 1 & 1 \end{pmatrix}$$

4. **(10 points)** Compute the determinant

$$\begin{vmatrix} 3 & 4 & 5 & 2 \\ 2 & 3 & 4 & 1 \\ 7 & 6 & 5 & 2 \\ 4 & 2 & 3 & 1 \end{vmatrix}$$

5. **(10 points)** Find $y$ using Cramer's rule:

$$\begin{cases} x + 3y + z = 3 \\ 2x - 6y + z = 1 \\ x + 9y - z = 3 \end{cases}$$

6. **(10 points)** For

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 7 \\ 2 & 4 & 8 \end{pmatrix}$$

compute

$$(a_{11} + 7a_{21})C_{11} + (a_{12} + 7a_{22})C_{12} + (a_{13} + 7a_{23})C_{13}\,.$$