

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number	Section(s)
Mathematics	204	All
Examination	Date	Pages
Midterm	October 2018	1

Special Instructions

▷ All questions have equal value.

(1) Use the Gauss-Jordan method to find all solutions of the following system:

$$\begin{aligned}2x_1 + 2x_2 - 2x_3 - x_4 - 2x_5 &= 0 \\4x_1 &\quad - x_5 = 0 \\8x_1 &\quad - x_3 = 0 \\10x_1 &\quad - 2x_4 = 0\end{aligned}$$

(2) Let $A = \begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix}$

(a) Find A^{-1}

(b) Use (a) to solve:

$$\begin{aligned}x_1 + x_3 &= 4 \\x_1 + x_2 &= 5 \\x_2 + x_3 &= 6\end{aligned}$$

(No marks if you don't use part (a))

(3) Calculate the determinant of $A = \begin{pmatrix} 1 & 4 & 3 & 1 & 4 \\ 3 & 2 & 4 & 3 & 2 \\ 0 & 1 & 6 & 0 & -1 \\ 2 & -1 & 1 & 2 & 1 \\ 1 & 2 & 0 & 1 & -1 \end{pmatrix}$

(4) Solve using Cramer's rule:

$$\begin{aligned}2x - y + z &= 4 \\x + y + 2z &= 3 \\x - 2y + 5z &= 6\end{aligned}$$

(No marks if you don't use Cramer's Rule)

(5) If A is an $n \times n$ matrix with all positive entries, is $\det(A) > 0$? Justify your answers.

(6) Find 3×3 matrices A and B , both non zero such that $\det(A + B) = \det A + \det B$.