

CONCORDIA UNIVERSITY

Department of Mathematics & Statistics

Course	Number	Section(s)
Mathematics	204	All
Examination	Date	Pages
Midterm	March 2018	2

Special Instructions

- ▷ Only approved calculators are allowed.
- ▷ Answer all questions.
- ▷ Justify all answers.

(1) [5 marks]

(a) Find the inverse of $A = \begin{pmatrix} 3 & -1 & 9 \\ 1 & -1 & 4 \\ 2 & -2 & 10 \end{pmatrix}$

$$A^{-1} = \begin{pmatrix} 1/2 & 2 & -5/4 \\ 1/2 & -3 & 3/4 \\ 0 & -1 & 1/2 \end{pmatrix}$$

(b) Solve the following equation for the matrix X : $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 2 \end{pmatrix} X \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix} = \begin{pmatrix} 2 & 5 \\ 1 & 0 \\ 0 & 1 \end{pmatrix}$

(2) [5 marks]

Use the Gauss-Jordan method to solve the following system:

$$-3x_1 + 2x_2 - x_3 + 6x_4 = -7$$

$$7x_1 - 3x_2 + 2x_3 - 11x_4 = 14$$

$$x_1 - x_4 = 1$$

$$(x_1, x_2, x_3, x_4) = (1 + s, -1 - 2s, 2 - s, s)$$

$$X = \begin{pmatrix} -7/5 & 8/5 \\ 11/5 & -4/5 \\ -7/5 & 3/5 \end{pmatrix}$$

(3) [5 marks]

Compute the determinant of $A = \begin{pmatrix} 2 & 1 & 6 & 2 \\ 3 & -2 & 4 & 1 \\ 3 & 2 & 5 & 4 \\ 4 & 5 & 1 & 0 \end{pmatrix}$

$$\det A = -265$$

(4) [5 marks]

Solve using Cramer's rule:

$$x_1 + x_2 - 2x_3 = -3$$

$$3x_1 - 2x_2 + 2x_3 = 9$$

$$6x_1 - 7x_2 - x_3 = 4$$

$$x_1 = \frac{79}{49}$$

$$x_2 = \frac{26}{49}$$

$$x_3 = \frac{124}{49}$$

(5) [5 marks]

$$\text{For } A = \begin{pmatrix} 17 & 21 & 19 \\ 25 & 27 & 29 \\ 31 & 20 & 18 \end{pmatrix}$$

Compute $a_{11}C_{11} + a_{21}C_{21} + a_{13}C_{13} + a_{22}C_{22}$

15 592

(6) [5 marks]

(a) Find values of h and k so that the system has no solutions

$$\begin{aligned} 2x + 5y &= -1 \\ hx + 5y &= k \end{aligned}$$

$\begin{cases} k \neq -1 \\ h \neq 2 \end{cases}$

(b) Find value(s) of k so that the system is consistent

$$\begin{aligned} 6x - 5y &= 4 \\ 9x + ky &= -1 \end{aligned}$$

$k \neq -\frac{15}{2}$