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.

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(1) [5 *marks*]

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

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

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

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

(2) [5 *marks*]
Use the Gauss-Jordan method to solve the following system:

$$-3x_1 + 2x_2 - x_3 + 6x_4 = -7$$
$$7x_1 - 3x_2 + 2x_3 - 11x_4 = 14$$
$$x_1 \qquad\qquad - x_4 = 1$$

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

(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:

$$x_1 + x_2 - 2x_3 = -3$$
$$3x_1 - 2x_2 + 2x_3 = 9$$
$$6x_1 - 7x_2 - x_3 = 4$$

$$X_1 = \frac{79}{49}$$

$$X_2 = \frac{22}{49}$$

$$X_3 = \frac{124}{49}$$

(5) [5 *marks*]

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

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

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

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

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

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