

MEMORIAL UNIVERSITY OF NEWFOUNDLAND  
DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 7

MATHEMATICS 2050

WINTER 2026

**Due: Monday, March 30th, 2026 at 6:00pm.** See the Gradescope Handout for submission information.

**Note:** You should complete the worksheets for Sections 2.6–3.2 before you work on this assignment.

1. Determine an  $LU$ -factorization of the matrix  $A = \begin{bmatrix} -2 & 3 & 1 \\ 1 & 3 & -3 \\ -6 & 0 & -2 \end{bmatrix}$ .

2. Consider the matrix  $A = \begin{bmatrix} 4 & 0 & 3 \\ 3 & -5 & -1 \\ 2 & -1 & 0 \end{bmatrix}$ .

- Determine the matrix of minors  $M$ .
- Determine the matrix of cofactors  $C$ .
- Compute the product  $AC^T$  and use it to find  $\det(A)$ .
- Use parts (a) to (c) to determine  $A^{-1}$ , if it exists.

3. Use the Laplace expansion to calculate the determinant of the given matrix.

(a)  $A = \begin{bmatrix} 1 & 4 & -2 \\ -5 & 0 & 1 \\ -1 & 3 & -2 \end{bmatrix}$

(b)  $B = \begin{bmatrix} -2 & 6 & 0 & 0 \\ 2 & 5 & -3 & 1 \\ 9 & 0 & -1 & 1 \\ 0 & -3 & 4 & -1 \end{bmatrix}$

4. Aurora is computing the determinant of a  $5 \times 5$  matrix  $A$ . Instead of applying the Laplace expansion directly, she uses Gaussian elimination to reduce  $A$  to an upper triangular matrix  $U$  with diagonal entries 1, 1, 1, 6 and 7. She employs the following elementary row operations:

- she subtracts 3 times Row 1 from Row 4
- she interchanges Row 2 with Row 5
- she subtracts  $-4$  times Row 2 from Row 3
- she multiplies Row 3 by  $\frac{1}{2}$
- she subtracts Row 4 from Row 5

What is  $\det(A)$ ?