MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 5 **MATHEMATICS 2050** WINTER 2026

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

> **Note:** You should complete the worksheet for Section 2.3 before you work on this assignment.

1. Solve each of the following systems of equations using Gaussian elimination and back-substitution. If a solution exists, express it as a vector or a linear combination of vectors.

(a)
$$\left.\begin{array}{rcl} 3y + 2z &=& 9 \\ x + y - z &=& 0 \\ 2x + 5y &=& -7 \end{array}\right\}$$

(b)
$$\left.\begin{array}{rcl} x - 4y - z &=& -13 \\ -2x + 3y + 3z &=& 2 \\ 3x - 5z &=& 17 \\ 9x + 2y &=& -1 \end{array}\right\}$$

(c)
$$\left.\begin{array}{rcl} w - x + 6y - 3z &=& 0 \\ w - 9x + 8y + z &=& -2 \\ 4x - y - 2z &=& 1 \\ w + 11x + 3y - 9z &=& 3 \end{array}\right\}$$

2. Given the system
$$\left.\begin{array}{rcl} x + 3y - 4z &=& 8 \\ -x - y + z &=& -4 \\ 2x + z &=& 4 \\ ax + by + cz &=& 0 \end{array}\right\}$$
determine the conditions on a, b and c for which the system will have the indicated number of solutions, or explain why no such conditions are possible.

   (a) a unique solution

   (b) an infinite number of solutions

   (c) no solutions