

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 2.3

Math 2050 Worksheet

WINTER 2026

For practice only. Not to be submitted.

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.

$$(a) \quad \left. \begin{array}{l} x + y + 6z = -5 \\ 4x - 2y - 3z = 1 \\ -2x + y + 2z = 0 \end{array} \right\}$$

$$(b) \quad \left. \begin{array}{l} x_1 - x_2 + 4x_3 = 5 \\ -x_1 + 3x_2 - 6x_3 = -13 \\ x_1 + x_2 + 2x_3 = -3 \end{array} \right\}$$

$$(c) \quad \left. \begin{array}{l} 2x + 6y - 4z = 4 \\ -3x - 4y + z = -6 \\ -x + 2y - 3z = 2 \end{array} \right\}$$

$$(d) \quad \left. \begin{array}{l} x_1 + 2x_2 - x_4 = 8 \\ 3x_1 + 6x_2 + x_3 - 2x_4 = 23 \\ x_3 + x_4 = -1 \end{array} \right\}$$

$$(e) \quad \left. \begin{array}{l} 3x_1 + x_2 - 5x_3 + 2x_4 = 2 \\ -2x_2 + x_3 - x_4 = -10 \\ x_1 + 4x_2 - 4x_3 + 8x_4 = 8 \\ -3x_1 - x_2 + 7x_3 = -6 \end{array} \right\}$$

2. Determine the conditions on p and q such that the following system has no solutions:

$$\left. \begin{array}{l} x - 3y - 5z = p \\ 4x - 10y - 16z = 0 \\ -4y - 8z = q. \end{array} \right\}$$

3. Find a polynomial $p(x)$ of degree 2 that passes through the points $(1, -4)$, $(-1, -12)$ and $(4, -7)$, by setting up a system of equations, then using Gaussian elimination and back-substitution.