

MA 203 Problems 2

1. Determine if the following system of linear equations is consistent.

(i) $2x_1 - x_2 - x_3 + 4x_4 = -2$

(ii) $2x_1 + 2x_3 + 3x_4 = 3$

(iii) $4x_1 + 2x_2 + 12x_3 + 7x_4 = 1$

(iv) $-2x_1 - x_2 - x_3 - x_4 = 2$

2. Solve the following system of equations by putting the augmented matrix into reduced echelon form.

(i) $x_1 + x_2 + x_3 = 3$

(ii) $2x_1 - x_3 - 3x_4 = 8$

(iii) $-2x_1 + 4x_2 + 2x_3 = -4$

3. Find all of the solutions to the following system of linear equations.

(i) $x_1 + 2x_2 + 2x_3 + 7x_4 = 1$

(ii) $x_1 + 2x_2 + 3x_3 + 10x_4 = 2$

(iii) $-x_1 - 2x_2 - 2x_3 - 6x_4 = 1$

4. Suppose we have a system of m linear equations in n unknowns, where $m < n$. With reference to the augmented matrix representing the system in reduced echelon form, briefly explain why the system is either inconsistent, or has infinitely many solutions, but not a unique solution.

5. Let A and I be the matrices

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{pmatrix}, \quad I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

Use row operations to transform A into a matrix identical to I . Simultaneously apply the same row operations to I that you apply to A , and call the resultant matrix B . Calculate AB .