

Section 3.2

Matrix

A matrix is a rectangular array of numbers.

Augmented Matrix

The augmented matrix of a system of linear equations is the matrix whose rows are the coefficient rows of the equations.

Elementary Row Operations

- a) Type 1: Multiplying or dividing a row by a nonzero number.
- b) Type 2: Multiplying a row by a nonzero number and adding or subtracting a multiple of another row.
- c) Type 3: Switching the order of the rows. This corresponds to switching the order in which we write the equations; occasionally this will be convenient.

Reduced Row Echelon Form

A matrix is said to be in reduced row echelon form or to be **row-reduced** if it satisfies the following properties.

- a) The first entry in each row (called the leading entry of that row) is a 1.
- b) The columns of the leading entries are clear (i.e. they contain zeros in all positions other than that of the leading entry).
- c) The leading entry in each row is to the right of the leading entry in the row above, and any rows of zeros are at the bottom.

Problem 1. Use Gauss-Jordan row reduction to solve the given system of equations.

- a) $3x - 2y = 6$
 $2x - 3y = -6$

b)

$$\begin{aligned} -x + 2y - z &= 0 \\ -x - y + 2z &= 0 \\ 2x \quad \quad - z &= 4 \end{aligned}$$

c)

$$\begin{aligned} -0.5x + 0.5y + 0.5z &= 1.5 \\ 4.2x + 2.1y + 2.1z &= 0 \\ 0.2x \quad \quad + 0.2z &= 0 \end{aligned}$$

Homework for this section: Read the section and watch the videos/tutorials. Then do these problems in preparation for the quiz: #1, 5, 7, 16