9.3 Systems of Equations and Matrices

Definition 9.3.1

A **matrix** is an array (or arrangement) of numbers, arranged in rows and columns

e. g. $A = \begin{pmatrix} 2 & 1 & 3 \\ 4 & 2 & 1 \\ 5 & 0 & 3 \end{pmatrix}$ is a matrix with 3 rows and 3 columns.

The numbers in a matrix are called **elements** of the matrix.

Notation: $A_{3\times 3} = \left[a_{ij} \right]$ "Row – Column"

where:

Using matrices to solve Systems of Linear Equations

Consider the system:

$$2x - y + z = 1$$
$$2x + y - 2z = 3$$
$$0x - y + 3z = 4$$

We can use the **coefficients** of the S.O.L.E. in an **Augmented Coefficient Matrix**.

We solve systems of linear equations using matrices by employing Elementary Row Operations! There are two techniques:

1) **Gaussian Elimination**

Here the goal is to get the **ACM** into the form:

After "simplifying" a matrix using Guassian Elimination, the matrix is said to be in **Row Echelon Form**

2) **Guass – Jordan Elimination**

Here the goal is to get the ACM into the form:

Example 9.3.1

Use Gaussian Elimination to solve the system:

$$2x + y - z = 1$$
$$x + y + 2z = -1$$
$$0x + y - z = 3$$

Example 9.3.2

Use Guass – Jordan Elimination to solve:

$$x - y + z = 0$$
$$x + 2y - z = 8$$
$$2x - 2y + z = -11$$

Class/Homework for Section 9.3

Pg. 552 – 553 #3, 7b, 8b: Pg. 595#3acf, 4