Section 8.1: Systems of Linear Equations in Two Variables

Key points:

- Two equations in two unknowns.
- Each point of intersection is a **solution** of the system.
- **consistent:** at least one solution.
- **inconsistent:** not consistent; no solution.
- **dependent:** infinitely many solutions.
- **independent:** not dependent; one or no solutions.

Elimination Method

Multiply the equations by some nonzero constant so that when the equations are added, a variable will cancel.

Substitution Method

Solve one equation for one of the variables and substitute this into the other equation.

Section 8.2: Systems of Linear Equations in 3 Variables

Key points:

- Three equations in three unknowns.
- Choose a variable to eliminate.
- Pick any two equations and eliminate that variable.
- Pick any two other equations and eliminate that same variable.
- Solve the new system of two equations in two unknowns, as in **Section 8.1**.
- Use these two values to find the third value.

Section 8.3: Using Matrices to Solve Systems of Linear Equations

Key points:

- Review matrix terminology: page 705.
- Know the Row-Equivalent Operations.
- Be able to convert a matrix to Row-Echelon Form.
- Be able to convert a matrix to Reduced Row-Echelon Form.

Matrix Terminology:

- **matrix (pl. matrices):** a rectangular array of numbers. The numbers in a matrix are called **entries**. A matrix has horizontal **rows** and vertical **columns**. A matrix with m-rows and n-columns is of **order** $m \times n$. When $m = n$, the matrix is called **square**. The **main diagonal** of a square matrix are the entries from the top-left to the bottom-right.
- **coefficient matrix:** a matrix that contains the coefficients for a system.
- **augmented matrix:** a matrix that contains the coefficients and constants for a system.

Row-Equivalent Operations:

- Interchange any two rows.
- Multiply each entry in a row by a nonzero constant.
- Add a nonzero multiple of one row to another row.

Row-Echelon Form:

- All rows consisting entirely of 0's are at the bottom.
- If a row does not consist entirely of 0's, then the first nonzero entry is a 1 (called a **leading 1**).
- For any two successive nonzero rows, the leading 1 in the lower row is to the right of the leading 1 in the higher row.

Reduced Row-Echelon Form:

- Each column that contains a leading 1 has 0's everywhere else.

Gauss-Jordan Elimination: Convert the augmented matrix to reduced row-echelon form using row-equivalent operations.