A. Def’ns:

1. System of linear equations: A system of linear equations is a collection of two or more linear equations.

2. Solution: A solution to a system of linear equations consists of values of the variables that are solutions to each equation in the system.

3. Types of Solutions:

   (a) If the lines are parallel, then the system of equations has no solutions, because the lines never intersect. The system is inconsistent

   (b) If the lines intersect, then the system of equations had one solution, given by the point of intersection. The system is consistent and the equations are independent

   (c) If the lines are coincident, then the system of equations has infinitely many solutions represented by the totality of the points on the line. The system is consistent and the equations are dependent.

B. Solve Systems of Equations by Substitution

1. Steps for Solving by Substitution:
   Step 1: Pick one of the equations and solve for one of the variables in terms of the remaining variables.
   Step 2: Substitute the result in the remaining equations.
   Step 3: If one equation in one variable results, solve this equation. Otherwise repeat Step 1 and 2 until a single equation with one variable remains.
   Step 4: Find the values of the remaining variables by back-substitution.
   Step 5: Check the solution.

C. Solve Systems of Equations by Elimination

1. Rules for obtaining an Equivalent System of Equations:
   (a) Interchange any two equations in the system
   (b) Multiply(or divide) each side of an equation by the same nonzero constant
   (c) Replace any equation in the system by the sum(or difference) of that equation and a nonzero multiple of any other equation in the system

2. Steps for Solving by Elimination:
   Step 1: Select two equations from the system and replace them by two equivalent equations that, when added, eliminate at least one variable.
Step 2: If there are additional equations in the original system, pair off each one with one of the equations selected in Step 1 and eliminate the same variable from them.

Step 3: Continue Steps 1 and 2 on successive systems until one equation containing one variable remains.

Step 4: Solve for this variable and back-substitute in previous equations until all the variables have been found.

Step 5: Check the solution.