

Systems of Linear Equations.

$$\begin{cases} 3x + 5y = 19 \\ 2x + 3y = 12 \end{cases}$$

have multiple equations and multiple unknowns
↓
System of

variables are to the power of "1" $\Rightarrow$ "Linear Equation"

Solve using Substitution

1. Isolate one variable in one equation
2. **Substitute** into all other equations
3. Repeat steps 1. and 2. until one variable is solved.
4. **Back substitute** all other equations to solve.

Solve using Elimination

1. Line 2. equations so all like variables are in columns
2. Multiple equations so coefficients of one variable are the same.
3. Subtract equation (1) from (2) to **eliminate** that variable.
4. Repeat steps 1., 2. and 3. until one variable remains.
5. **Back substitute** all other equations to solve.

Solve using Row echelon reduction (Matrices)

1. Put equations into Matrix Form $\Rightarrow$ Row echelon Form
2. Solve using **elimination** method using the following order:

$$\begin{bmatrix} a & b^{12} & c^{11} & d^9 \\ e^1 & f & g^{10} & h^8 \\ i^2 & j^4 & k & l^7 \\ m^3 & n^5 & o^6 & p \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} q \\ r \\ s \\ t \end{bmatrix}$$