A set of m linear equations in n variables is called a *system of linear equations* or a *linear system*.

$$a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n = b_1$$
$$a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n = b_2$$
$$\vdots$$
$$a_{m1}x_1 + a_{m2}x_2 + \ldots + a_{mn}x_n = b_m$$

In the linear system above each a_{ij} and b_i will be numbers and each x_j will be a variable. ($1 \le i \le m$; $1 \le j \le n$)

A *solution* for a linear system is an ordered n-tuple ($s_1, s_2, \ldots, s_n$) of numbers that makes each equation in the system true when the values $s_1, s_2, \ldots, s_n$ are substituted for $x_1, x_2, \ldots, x_n$ respectively.

The set of all possible solutions for a linear system is called the *solution set* for the system. Two linear systems are called *equivalent* if they have the same solutions set.

We solve linear systems by a systemetic procedure that allows us to replace one system with an equivalent system that is easier to solve. The following three actions produce equivalent linear systems:

***Replacement* – Replace one equation by the sum of itself and a multiple of another equation ($kE_j + E_i \rightarrow E_i$)**

***Interchange* – Interchange two rows ($E_j \leftrightarrow E_i$)**

***Scaling* – Multiply all entries in a row by a nonzero constant ($kE_i \rightarrow E_i$)**