Linear Algebra

Class: ...

Definition

Linear Functions	All terms are of degree 0 or 1. A solution of a system of linear equation is set of points that makes the equation system true.
Consistent	lin. systems is consistent if either 1 or ∞ solutions exist else inconsistent.
Conist	

Coefficient Matrix

$$\begin{cases} A_1x_1 + A_2x_2 + A_3x_3 = \alpha \\ B_1x_1 + B_2x_2 + B_3x_3 = \beta \\ C_1x_1 + C_2x_2 + C_3x_3 = \gamma \end{cases} \Leftrightarrow \begin{bmatrix} A_1 & A_2 & A_3 \\ B_1 & B_2 & B_3 \\ C_1 & C_2 & C_3 \end{bmatrix} \tag{1}$$

Augmented Matrix

$$\begin{cases} A_1x_1 + A_2x_2 + A_3x_3 = \alpha \\ B_1x_1 + B_2x_2 + B_3x_3 = \beta \\ C_1x_1 + C_2x_2 + C_3x_3 = \gamma \end{cases} \Leftrightarrow \left[\begin{array}{ccc|c} A_1 & A_2 & A_3 & \alpha \\ B_1 & B_2 & B_3 & \beta \\ C_1 & C_2 & C_3 & \gamma \end{array}\right] \tag{2}$$

Row-Equivalence

Two matrce are row-equivalent if there is a sequence of **EROS** that transforms one into the other.

Elementary Row Operations (EROS)

1. [**Replacement**] Replace one row by sum of itself.
2. [**Interchange**] Swap position of 2 rows.
3. [**Scaling**] Multiply all entries in row by non-zero constant.

Echelon Form (ef)

1. All non-zero rows are above any rows of all-zero.
2. Each leading entry of a row is in a column to the right of the roe above it.
3. All entries in a column below a leading entry are 0.

Reduced Row Echelon Form (rref)

1. As to be in echelon form.
2. Leading entry in each row is 1.
3. Each leading 1 is the only non-zero entry in its column.

Pivot

A pivot position

Theorems

Theorem 1 *Every matrix is row equivalent to a unique row echelon form.*

Theorem 2 *Every matrix is row equivalent to a unique row echelon form.*