Avg. 76.2%

Today §3.2

<u>Remark</u>: If $w \in \mathbb{R}^m$ and A is a matrix having m rows, then $w^T A$ is a linear combination of the rows of A.

<u>Eg</u>. of a row-pivot of an m×n matrix A, expressed as a product $\underset{m\times m}{E}\underset{m\times n}{A}$

alternating matrix

$$\underbrace{\begin{bmatrix} 1 & 3 & 4 & 5 \\ -2 & 6 & -8 & 3 \\ 7 & 9 & 1 & -2 \end{bmatrix}}_{A}$$, pivot as indicated, leads to

$$\underbrace{\begin{bmatrix} \frac{1}{5} & 0 & 0 \\ -\frac{3}{5} & 1 & 0 \\ -\frac{2}{5} & 0 & 1 \end{bmatrix}}_{E}\underbrace{\begin{bmatrix} 1 & 3 & 4 & 5 \\ -2 & 6 & -8 & 3 \\ 7 & 9 & 1 & -2 \end{bmatrix}}_{A}$$

Another way:

$$\left[\underbrace{\begin{matrix} 5 \\ 3 \\ -2 \end{matrix}}_{\substack{\text{pivotal}\\ \text{column}}} \middle| \underbrace{\begin{matrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{matrix}}_{\substack{3\times 3\\ \text{identity}}}\right] \simeq \left[\underbrace{\begin{matrix} 1 \\ 0 \\ 0 \end{matrix}}_{\substack{\text{replaces}\\ \text{the pivotal}\\ \text{column}}} \middle| \underbrace{\begin{matrix} \frac{1}{5} & 0 & 0 \\ -\frac{3}{5} & 1 & 0 \\ \frac{2}{5} & 0 & 1 \end{matrix}}_{E}\right]$$

<u>Remark</u>: If Tableau (P) is a tableau in a simplex solution of a problem beginning from Tableau (1), the constraint part of tableau (P) is an <u>m×m matrix</u> the constraint part of tableau (1)

called B

There are 2 ingredients for the strong duality theorem (Thm 3.7):

(1) B^{-1}

(2) Reconstruction of an objective row, as in beginning phase 1 or phase 2.