Thm 13

If two matrices A and B are row equivalent, then their row spaces are the same. If B is in echelon form, the nonzero rows of B form a basis for the row space of A as well as for that of B.

Def:

• $\underline{\text{row } A}$ = span of Rows of A.

• The **rank** of A is the dimension of the column Space of A.

Thm 14

The Rank Theorem

The dimensions of the column space and the row space of an $m \times n$ matrix A are equal. This common dimension, the rank of A, also equals the number of pivot positions in A and satisfies the equation

$$\text{rank } A + \dim \text{Nul } A = n$$

Warning!

Row operations $\underline{\text{Do NOT}}$ preserve row linear dependence.