IF A IS AN $m \times R$ MATRIX AND B IS AN $R \times N$ MATRIX, __AB__ IS THE MATRIX WHOSE ij ENTRY IS FOUND BY SINGLING OUT ROW i OF A AND COLUMN j OF B, MULTIPLYING CORRESPONDING ENTRIES FROM THE ROW AND COLUMN TOGETHER AND ADDING THEM UP.

A MATRIX CAN BE __PARTITIONED__ INTO SMALLER MATRICES BY INSERTING HORIZONTAL AND VERTICAL RULES BETWEEN SELECTED ROWS AND COLUMNS. THESE SMALLER MATRICES ARE CALLED __SUBMATRICES__.

THUS, IF THE MATRIX B IS PARTITIONED INTO COLUMN VECTORS $b_1, b_2, \dots, b_N$, $AB = A[b_1 | b_2 | \cdots | b_N] = [Ab_1 | Ab_2 | \cdots | Ab_N]$

AND IF A IS PARTITIONED INTO ROW VECTORS $A_1, A_2, \dots, A_N$

$$AB = \left[\begin{array}{c} A_1 \\ \hline A_2 \\ \vdots \\ \hline A_N \end{array}\right] \cdot B = \left[\begin{array}{c} A_1 B \\ \hline A_2 B \\ \hline \vdots \\ \hline A_N B \end{array}\right]$$

ANY LINEAR SYSTEM CAN BE REGARDED AS

$$A_{11} x_1 + A_{12} x_2 + \cdots + A_{1N} x_N = B_1$$
$$A_{22} x_1 + A_{22} x_2 + \cdots + A_{2N} x_N = B_2$$
$$A_{m1} x_1 + A_{m2} x_2 + \cdots + A_{mN} x_N = B_m$$

$$A \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_N \end{bmatrix} = \begin{bmatrix} B_1 \\ B_2 \\ \vdots \\ B_N \end{bmatrix}$$

IF A IS AN $N \times m$ MATRIX, __A^T__ (THE __TRANSPOSE__ OF A) IS THE $m \times N$ MATRIX GOTTEN BY INTERCHANGING THE ROWS AND COLUMNS OF A.

IF A IS A SQUARE MATRIX, __$\mathrm{tr}(A)$__ (THE __TRACE__ OF A) IS THE SUM OF THE ENTRIES ON THE MAIN DIAGONAL OF A