Inner Product:

a = Nx1 vector

b = scalar

$$c = a^T b$$

$$c = \sum_{j=1}^{N} a_j b_j$$

Vector outer product:

a = Nx1

b = 1xM

$$c = ab^T$$

Identity Matrix:

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = A^{-1}A = AA^{-1}$$

Inverse 2x2:

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \qquad A^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

Kronecker Delta:

$$\delta_{ij} = \begin{cases} 1 & i = j \\ 0 & otherwise \end{cases} \qquad \sum_j \delta_{ij} a_j = a_i$$