Prerequisites from Linear Algebra and Matrix Theory

Finite-Dimensional Complex Linear Spaces and Matrices.
Complex Linear n-space.
We define an n-vector x to be an ordered n-tuple of complex numbers $\xi_1, \xi_2, \ldots \xi_n$ which we write as a column:

$$x = \begin{bmatrix} \xi_1 \\ \ldots \\ \xi_n \end{bmatrix}$$

The set of all such vectors is denoted by $\mathbb{C}^n$. We denote complex conjugation by a bar:($\bar{z} = a - ib, z = a + ib$)

$$\bar{x} = \begin{bmatrix} \bar{\xi}_1 \\ \ldots \\ \bar{\xi}_n \end{bmatrix}$$

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The vector with zero components will be denoted by 0. The transpose of an n-vector x is an ordered n-tuple of complex numbers written as a row:

$$x^t = (\xi_1, \xi_2, \ldots, x_n)$$

The Hermitian conjugate of x is defined by

$$x^* = \overline{x^t} = (\bar{\xi}_1, \bar{\xi}_2, \ldots, \bar{\xi}_n)$$

The vectors $x + y$ and λx, where λ is a complex number are defined by

$$\begin{bmatrix} \xi_1 + \eta_1 \\ \cdots \\ \xi_n + \eta_n \end{bmatrix} \quad \text{and} \quad \begin{bmatrix} \lambda\eta_1 \\ \cdots \\ \lambda\eta_n \end{bmatrix}$$