

$$u, v \in \mathbb{R}^n$$

$$u \cdot v = \sum_{i=1}^n u_i v_i$$

$$a \in \mathbb{R}^{1 \times n}$$

$$b \in \mathbb{R}^{n \times 1}$$

$$ab = [a_1 \dots a_n] \begin{bmatrix} b_1 \\ \vdots \\ b_n \end{bmatrix} = a_1 b_1 + \dots + a_n b_n = a \cdot b$$

$$X \in \mathbb{R}^{3 \times 3}$$

$$X = \begin{bmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{bmatrix}$$

$$\mathbb{C}^{2 \times 2}$$

is

2

by 2

complex

valued matrix