向量

$$\alpha=\begin{pmatrix}a_1\\ \vdots\\ a_n\end{pmatrix}-n\text{维列向量}$$

模

$$\alpha=\begin{pmatrix}a_1\\ \vdots\\ a_n\end{pmatrix}$$

$$|\alpha|\triangleq\sqrt{a_1^2+\ldots+a_n^2}$$

$$\begin{aligned}&\text{若}|\alpha|=0,\text{则}\alpha=0\\&\text{若}|\alpha|=1,\text{称}\alpha\text{为单位向量或规范向量}\\&\text{若}\alpha\neq0,\alpha^{\circ}=\frac{1}{|\alpha|}\alpha-\text{单位化或规范化}\end{aligned}$$

内积

$$\begin{aligned}&\alpha=\begin{pmatrix}a_1\\ \vdots\\ a_n\end{pmatrix},\beta=\begin{pmatrix}b_1\\ \vdots\\ b_n\end{pmatrix}\\&(\alpha,\beta)\triangleq a_1b_1+\ldots+a_nb_n\\&①(\alpha,\beta)=(\beta,\alpha)=\alpha^T\beta=\beta^T\alpha\\&②(\alpha,\alpha)=\alpha^T\alpha=|\alpha|^2\\&\begin{cases}(\alpha,\alpha)=|\alpha|^2\geq0,(\alpha,\alpha)=0\Leftrightarrow\alpha=0\\\text{若}\alpha\neq0,(\alpha,\alpha)=\alpha^T\alpha=|\alpha|^2>0\end{cases}\\&③(\alpha,k_1\beta_1+\ldots+k_s\beta_s)=k_1(\alpha,\beta_1)+\ldots+k_s(\alpha,\beta_s)\\&④\text{若}(\alpha,\beta)=0,\text{称}\alpha,\beta\text{正交},\text{记}\alpha\perp\beta.\\&\text{零向量与任何向量正交}\end{aligned}$$