

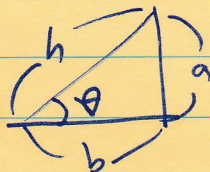
2019/12/03

Inner products and Trigonometric function of Vector

$$a^T b = \|a\| \cdot \|b\| \cdot \cos \theta$$

$$\sin \theta = \frac{a}{h}$$

$$\cos \theta = \frac{b}{h}$$



Sin θ Case

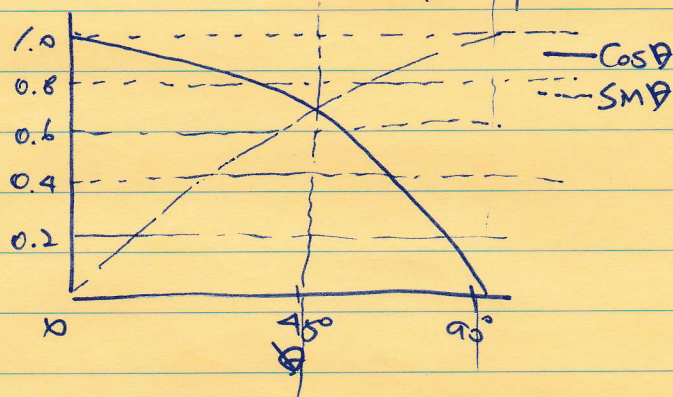
$$\sin 0^\circ = 0$$

$$\sin 90^\circ = 1$$

Cos θ Case

$$\cos 0^\circ = 1$$

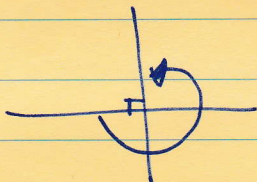
$$\cos 90^\circ = 0$$



Orthogonal

$$a \perp b$$

$$\cos 90^\circ = 0$$



$$a^T b = b^T a = 0 \iff a \perp b$$

example) $a = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, b = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$

$$\rightarrow a^T b = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} -1 \\ 1 \end{bmatrix} = -1 + 1 = 0$$

$\Rightarrow a, b$ are orthogonal