$$\underline{u} = (u_1, \ldots\ldots, u_n)$$

$$\underline{v} = (v_1, \ldots\ldots, v_n)$$

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

algebraic def'n of dot product

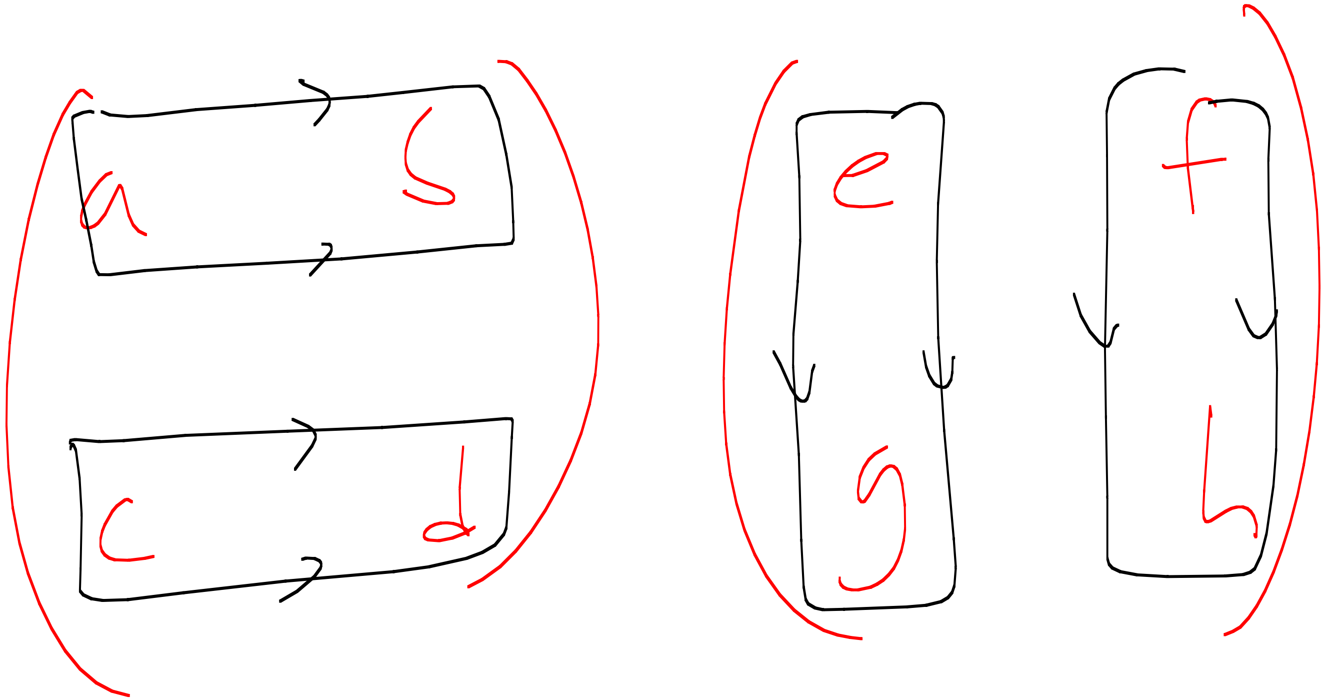
If $\underline{u} \cdot \underline{v} = 0 \implies$

$\underline{u}$ & $\underline{v}$ are perpendicular vectors.

$\frac{\pi}{2}$

$$\|u\|\|v\| \cos\overset{\pi/2}{\theta} = \underline{u} \cdot \underline{v} = \sum_{i=1}^{n} u_i v_i$$

$$\theta = \cos^{-1}\left[\frac{\sum u_i v_i}{\|u\|\|v\|}\right]$$



$$\begin{bmatrix} (a,b)\cdot(e,g) & (a,b)\cdot(f,h) \\ (c,d)\cdot(e,g) & (c,d)\cdot(f,h) \end{bmatrix}$$

$$\begin{bmatrix} \alpha & a & b \\ a & \beta & c \\ b & c & \gamma \end{bmatrix}$$

pivot

$$\left(\begin{array}{ccccc|c}
\boxed{a} & b & c & d & e & \alpha \\
1\ f & \boxed{g} & h & i & j & \beta \\
2\ k & 5\ \boxed{l} & \boxed{m} & n & o & \gamma \\
3\ p & 6\ q & 8\ r & \boxed{s} & t & \delta \\
4\ u & 7\ v & 9\ w & x\ 10 & \boxed{y} & \varepsilon
\end{array}\right)$$

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$M_{21} = \begin{vmatrix} e & f \\ h & i \end{vmatrix} = (-1)^{i+j}(ei - fh)$$

$$(-1)^{2+2}\begin{vmatrix} a & c \\ g & i \end{vmatrix}$$

$$ai - gc$$

$$A\underline{v} = \lambda \underline{v}$$

$$A\underline{v} - \lambda \underline{v} = \underline{0}$$

$$A\underline{v} - \underbrace{\lambda \underline{I} \underline{v}}_{\underline{v}} = \underline{0}$$

$$(\underline{A} - \lambda \underline{I})\underline{v} = \underline{0}$$

$$(A - \lambda I)\underline{v} = \underline{0}$$

Solve for $\underbrace{|A - \lambda I| = 0}$

λ

$$(A - \lambda I)\boxed{\underline{v}} = \underline{0}$$

$$|A-\lambda I| = \begin{vmatrix} 1-\lambda & 1 & 1 \\ 1 & -1-\lambda & 1 \\ 1 & 1 & -1-\lambda \end{vmatrix}$$

$$(1-\lambda)\left[(-1-\lambda)^2-1\right] - 1\left[-1-1\lambda-1\right] + 1\left[1+1+1\lambda\right]$$

$$= 0$$

A normalized vector is simply one when we divide by its size →

unit vector

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$|a| = |b| + |c| \quad \times$$

$$|e| > |d| + |f| \quad \checkmark$$

$$|i| > |g| + |h| \quad \checkmark$$