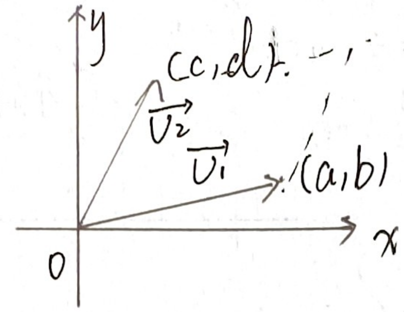
<2>



令 $\vec{n} = t\underbrace{(b,-a)}_{一个法向量}$ $\quad |\vec{n}| = t|\vec{v_1}|$

$$h = \left|\vec{v_2}\cdot\frac{\vec{n}}{|\vec{n}|}\right| = \frac{|(c,d)\cdot(b,-a)\cdot t|}{|\vec{v_1}|\cdot t} = \frac{|(c,d)(b,-a)|}{|\vec{v_1}|}$$

$$S = |\vec{v_1}|\cdot h = |(c,d)\cdot(b,-a)| = |bc-ad|$$

$$\det\begin{pmatrix} a & c \\ b & d \end{pmatrix} = ad-bc \qquad \left|\det\begin{pmatrix} a & c \\ b & d \end{pmatrix}\right| = S.\ (几何意义)$$

<3> $\left|\det\begin{pmatrix} a & d & x \\ b & e & y \\ c & f & z \end{pmatrix}\right| = V$ (平行六面体体积).

$$|\vec{v_1}\times\vec{v_2}| = |\vec{v_1}|\cdot|\vec{v_2}|\cdot\sin\theta = S. \qquad \begin{cases} |\vec{n}| = S. \\ \vec{n} = \vec{v_1}\times\vec{v_2} \end{cases}$$

$$\boxed{\vec{n}\cdot(x,y,z) = Sh} \Uparrow \boxed{\frac{\vec{n}}{|\vec{n}|}\cdot(x,y,z) = h}$$

$$V = Sh \Rightarrow \boxed{\det\begin{pmatrix} a & d & x \\ b & e & y \\ c & f & z \end{pmatrix} = \vec{n}\cdot(x,y,z)}$$

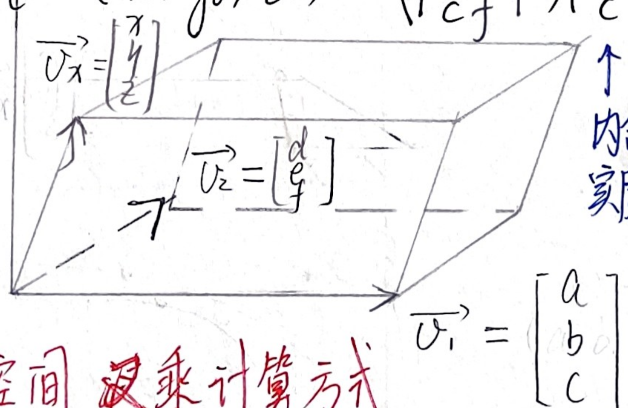
$\vec{n}, |\vec{n}| = S$

$$x\cdot x_0 + y\cdot y_0 + z\cdot z_0.$$

$$= x\begin{vmatrix} b & e \\ c & f \end{vmatrix} + y\begin{vmatrix} a & d \\ c & f \end{vmatrix} + z\begin{vmatrix} a & d \\ b & e \end{vmatrix}.$$ 一种简记方式。

$$\vec{n} = (x_0, y_0, z_0) = \left(\begin{vmatrix} b & e \\ c & f \end{vmatrix}, \begin{vmatrix} a & d \\ c & f \end{vmatrix}, \begin{vmatrix} a & d \\ b & e \end{vmatrix}\right) \Rightarrow \vec{n} = \begin{vmatrix} a & d & \hat{i} \\ b & e & \hat{j} \\ c & f & \hat{k} \end{vmatrix}$$

↑ 内含实质.



$\vec{v_1}, \vec{v_2}, \vec{v_x}$ 所张成平行六面体的体积由 $\vec{v_x}$ 决定

(底面 S 确定而高 h 由 $\vec{v_x}$ 决定)

$$\left|\vec{v_x}\cdot\frac{\vec{n}}{|\vec{n}|}\right| = h$$

$$\vec{v_x}\cdot\vec{n} = h\cdot|\vec{n}| = h\cdot S = V$$

3维空间 ~~叉~~叉乘计算方式

及其几何直观表示。