$A=(1,0,1)$ $B=(1,1,2)$ $C=(2,1,1)$ $D=(p,p,p)$

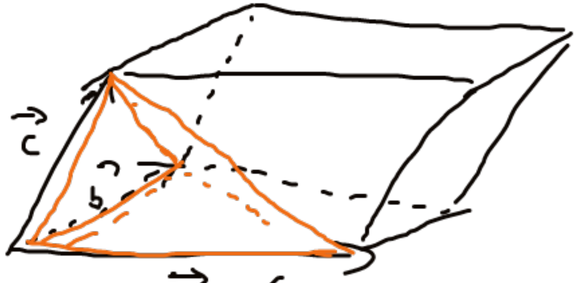
$\vec{AB}=(0,1,1)$

$\vec{AC}=(1,1,0)$

$\vec{AD}=(p-1,p,p-1)$

$$V_{\triangle} = \frac{1}{6}\left|\det\begin{bmatrix}0 & 1 & 1\\ 1 & 1 & 0\\ p-1 & p & p-1\end{bmatrix}\right|$$

$$V_{\triangle} = 1$$



$$V=\left|(\vec{a}\times\vec{b})\circ\vec{c}\right| =$$

$$=\left|\det\begin{bmatrix}a_x & a_y & a_z\\ b_x & b_y & b_z\\ c_x & c_y & c_z\end{bmatrix}\right|$$

$$V_{\triangle}=\frac{1}{6}V$$