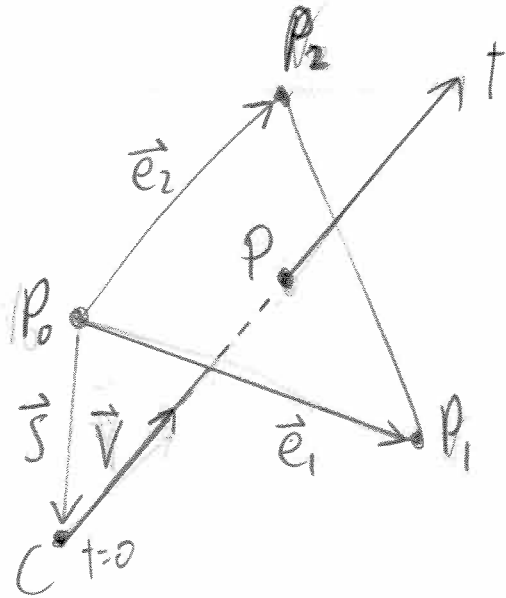




# Ray-Triangle Intersections



$$P(\alpha, \beta, \gamma) = \alpha P_0 + \beta P_1 + \gamma P_2$$

$$\alpha + \beta + \gamma = 1$$

$$0 \leq \alpha, \beta, \gamma \leq 1$$

$$P(\alpha, \beta, \gamma) = (1 - \beta - \gamma)P_0 + \beta P_1 + \gamma P_2$$

$$C + t\vec{V} = (1 - \beta - \gamma)P_0 + \beta P_1 + \gamma P_2$$

$$\underbrace{C - P_0}_{\vec{s}} = -t\vec{V} + \beta \underbrace{(P_1 - P_0)}_{\vec{e}_1} + \gamma \underbrace{(P_2 - P_0)}_{\vec{e}_2}$$

Solve for 3 eqns in 3 unknowns:

$$\begin{bmatrix} \vec{s} \end{bmatrix} = \begin{bmatrix} -\vec{V} & \vec{e}_1 & \vec{e}_2 \end{bmatrix} \begin{bmatrix} t \\ \beta \\ \gamma \end{bmatrix}$$

Then check to see if  $P$  lies within  $\triangle P_0 P_1 P_2$ ,  
i.e., test  $0 \leq \beta, \gamma \leq 1$