$$\begin{bmatrix} (1-\alpha+u)^2-\lambda & u^2 & -2u(1-\alpha+u) \\ 1 & -\lambda & 0 \\ (1-\alpha+u) & 0 & -u-\lambda \end{bmatrix}$$

$$\det \quad (-u-\lambda) \det \Big[\quad \Big]$$

$$\begin{bmatrix} (1-\alpha+u)^2-\lambda & u^2 \\ 1 & -\lambda \end{bmatrix} + \frac{1}{u+\lambda} \begin{bmatrix} -2u(1-\alpha+u) \\ 0 \end{bmatrix} \begin{bmatrix} 1-\alpha+u & 0 \end{bmatrix}$$

$$\begin{pmatrix} (1-\alpha+u)^2-\lambda & u^2 \\ 1 & -\lambda \end{pmatrix} + \frac{1}{u+\lambda} \begin{bmatrix} -2u(1-\alpha+u)^2 & 0 \\ 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} \left(1-\frac{2u}{u+\lambda}\right)(1-\alpha+u)^2-\lambda & u^2 \\ 1 & -\lambda \end{bmatrix} \to \begin{bmatrix} \frac{\lambda-u}{u+\lambda}(1-\alpha+u)^2-\lambda & u^2 \\ 1 & -\lambda \end{bmatrix}$$

$$\det\begin{bmatrix} (\lambda-u)(1-\alpha+u)^2-(u+\lambda)\lambda & (u+\lambda)u^2 \\ u+\lambda & -\lambda(u+\lambda) \end{bmatrix}$$

$$= (\lambda-u)(1-\alpha+u)^2+\lambda^2(u+\lambda)-(u+\lambda)^2u^2$$

$\lambda = u$ or

$(\Leftarrow)$ $(1+\alpha+u)^2+(u+\lambda)^3 = 0$

$u+\lambda = (1+\alpha+u)^{\frac{2}{3}}$

$\Downarrow$

$\lambda \le 0 \rightarrow |\lambda|$

$$-\lambda(\lambda-u)(1-\alpha+u)^2(u+\lambda) - (u+\lambda)^2u^2 + \lambda^2(u+\lambda)^2$$

$$-\lambda(1-\alpha+u)^2 + (u+\lambda)^2 = 0$$

$(\Leftarrow)$

$\cancel{(1-\alpha+u) = \pm\frac{u+\lambda}{\sqrt{\lambda}}}$

$\cancel{(1-\alpha+u)\sqrt{\lambda}} =$

$\cancel{\lambda^2+2u\lambda+u^2 = \lambda(1-\alpha+u)^2}$

① $(1-\alpha+u) = \dfrac{u+(\sqrt{\lambda})^2}{\sqrt{\lambda}} \Longleftrightarrow t^2-(1-\alpha+u)t+u=0$

② $-(1-\alpha+u) = \dfrac{u+(\sqrt{\lambda})^2}{\sqrt{\lambda}} \Longleftrightarrow t^2+(1-\alpha+u)t+u=0$

$\Updownarrow$