$$\max \quad \left(\theta c^{\nu} + (1-\theta)(d^{\nu})\right)$$

$$\text{s.t.} \quad c + pd = Y$$

$$\mathcal{L}(c, d, \lambda) = \theta c^{\nu} + (1-\theta) d^{\nu} + \lambda (Y - c - pd)$$

$$\frac{\partial \mathcal{L}}{\partial c} = 0; \quad \theta \nu c^{\nu-1} + \lambda(-1) = 0 \qquad ①$$

$$\frac{\partial \mathcal{L}}{\partial d} = 0; \quad (1-\theta)\nu d^{\nu-1} + \lambda(-p) = 0 \qquad ②$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 0, \quad c + pd = Y \qquad ③$$

① in ②; $\therefore \theta \nu c^{\nu-1} = \lambda = \frac{1}{p}(1-\theta)\nu d^{\nu-1}$ ~~① in ②~~

$$\therefore p \frac{\theta}{1-\theta} c^{\nu-1} = d^{\nu-1}$$

$$\therefore d = c \left[p \frac{\theta}{1-\theta}\right]^{\frac{1}{\nu-1}} \quad \text{—} ④$$

④ in ③:

$$c + pc\left[p\frac{\theta}{1-\theta}\right]^{\frac{1}{\nu-1}} = Y$$

$$\therefore c\left[1 + p \cdot p^{\frac{1}{\nu-1}} \cdot \left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\nu-1}}\right] = Y$$

$$\therefore c\left[1 + p^{\frac{\nu}{\nu-1}} \left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\nu-1}}\right] = Y$$

$$\therefore c = \frac{Y}{\left[1 + p^{\frac{\nu}{\nu-1}} \left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\nu-1}}\right]}$$