一.

1. AP_L勞動平均產量

$$AP_L = \frac{Q}{L} = \frac{L^{\alpha}K^{\beta}}{L} = L^{\alpha-1}K^{\beta}$$

2. AP_M資本平均產量

$$AP_M = \frac{Q}{M} = \frac{L^{\alpha}K^{\beta}}{M} = L^{\alpha}K^{\beta-1}$$

3. MP_L勞動邊際產量

$$MP_L = \frac{dQ}{dL} = \alpha L^{\alpha-1}K^{\beta}$$

4. MP_K資本邊際產量

$$MP_K = \frac{dQ}{dK} = \beta L^{\alpha}K^{\beta-1}$$

5. MRTS 邊際技術替代率

$$\text{MRTS} = \frac{-dK}{dL} = \frac{MP_L}{MP_K} = \frac{\alpha L^{\alpha-1}K^{\beta}}{\beta L^{\alpha}K^{\beta-1}} = \frac{\alpha K}{\beta L}$$

6. ε^L勞動產量彈力

$$\varepsilon^L = \frac{\frac{dQ}{Q}}{\frac{dL}{L}} = \frac{\frac{dQ}{dL}}{\frac{Q}{L}} = \frac{MP_L}{AP_L} = \frac{\alpha L^{\alpha-1}K^{\beta}}{L^{\alpha-1}K^{\beta}} = \alpha$$

7. ε^K資本產量彈性

$$\varepsilon^L = \frac{\frac{dQ}{Q}}{\frac{dK}{K}} = \frac{\frac{dQ}{dK}}{\frac{Q}{K}} = \frac{MP_K}{AP_K} = \frac{\beta L^{\alpha}K^{\beta-1}}{L^{\alpha}K^{\beta-1}} = \beta$$

8. $\varepsilon^{\emptyset}$生產力彈性

$$\varepsilon^L = \frac{\frac{dQ}{Q}}{\frac{dK}{K}} = \frac{\frac{dQ}{dK}}{\frac{Q}{K}} = \frac{MP_K}{AP_K} = \frac{\beta L^{\alpha}K^{\beta-1}}{L^{\alpha}K^{\beta-1}} = \beta$$

9. ε^{LK}替代彈性

$$\varepsilon^{LK} = \varepsilon^L + \varepsilon^K = \alpha + \beta$$

二.

1.函數呈現固定規模報酬。對

當 L 和 K 增加 n 倍→nL 和 nK，生產函數為$\text{F}(nL, nK) = 2(nL) + 3(nK) = n(2L + 3K) = \text{nQ}$，

呈現固定規模報酬

2.函數呈現遞減。 錯

$MP_L = \frac{dQ}{dL} = 2$，$MP_K = \frac{dQ}{dK} = 3$，資本與勞動的邊際生產力(MP_L 和 MP_K)都固定，沒有邊際生產力遞減

3.函數呈現固定的技術替代率。-- 對

$\text{MRTS} = \frac{MP_L}{MP_K} = \frac{2}{3}$，技術替代率(MRTS)成固定值($\frac{2}{3}$)