

5. 預算限制 = $300 = 10X + 20Y$

I
 偏好 = $U = f(X, Y) = X^{\frac{2}{3}} Y^{\frac{1}{3}}$
 最適消費條件 = $MRS_{XY} = \frac{\frac{2}{3} X^{-\frac{1}{3}} Y^{\frac{1}{3}}}{\frac{1}{3} X^{\frac{2}{3}} Y^{-\frac{2}{3}}} = \frac{P_X}{P_Y} = \frac{10}{20}$

$\rightarrow Y = \frac{1}{4}X \rightarrow \begin{cases} 300 = 10X + 20Y \\ Y = \frac{1}{4}X \end{cases} \rightarrow \begin{cases} X = 20 \\ Y = 5 \end{cases}$

II

偏好 = $U = f(X, Y) = X + 3Y$
 最適消費條件 = $MRS_{XY} = \frac{1}{3} < \frac{P_X}{P_Y} = \frac{10}{20} = \frac{1}{2}$

$\rightarrow X = 0, Y = 15$

III

偏好 = $U = f(X, Y) = \min(X, Y)$
 最適消費條件 = $Y = X$
 $\rightarrow \begin{cases} 300 = 10X + 20Y \\ Y = X \end{cases} \rightarrow \begin{cases} X = 10 \\ Y = 10 \end{cases}$

6. 預算限制 = $12,000 = 400X + 600Y$
 效用函數 $U = X^{\frac{1}{2}} Y^{\frac{1}{2}}$

① $MRS_{XY} = \frac{P_X}{P_Y} = \frac{400}{600} = \frac{2}{3} = \frac{\frac{1}{2} X^{-\frac{1}{2}} Y^{\frac{1}{2}}}{\frac{1}{2} X^{\frac{1}{2}} Y^{-\frac{1}{2}}}$

$\rightarrow 2X = 3Y \rightarrow \begin{cases} 2X = 3Y \\ 2X + 3Y = 60 \end{cases} \rightarrow \begin{cases} X = 15 \text{ (英文) (時)} \\ Y = 10 \text{ (電腦) (時)} \end{cases}$

② $X + Y = 23$

$\begin{cases} X + Y = 23 \\ 3Y = 2X \end{cases} \rightarrow \begin{cases} X = 13.8 \text{ (英文) (時)} \\ Y = 9.2 \text{ (電腦) (時)} \end{cases}$