week 5

5. $300 = 10x + 20y$

I 若偏好為 $U = f(x,y) = x^{\frac{2}{3}} y^{\frac{2}{3}}$，則早餐消費決策為 $\text{Max } U = f(x,y) = x^{\frac{2}{3}} y^{\frac{2}{3}}$ subject to $300 = 10x + 20y$

根據最適條件 $= MRS_{xy} = \frac{\frac{2}{3} x^{-\frac{1}{3}} y^{\frac{2}{3}}}{\frac{2}{3} x^{\frac{2}{3}} y^{-\frac{1}{3}}} = \frac{P_x}{P_y} = \frac{10}{20}$

$\Rightarrow y = \frac{1}{4}x$，代回 $300 = 10x + 20y$，得 $x = 20, y = 5$

每週買 20 杯奶茶和 5 個漢堡

II 若偏好為 $U = f(x,y) = x + 3y$，則消費決策為 $= \text{Max } U = f(x,y) = x + 3y$

依據最適消費條件 $= MRS_{xy} = \frac{1}{3} < \frac{P_x}{P_y} = \frac{10}{20} = \frac{1}{2}$

∴ $x = 0, y = 15$，因此每週會員 0 杯奶茶和 15 個漢堡

6. $(5,6) \Rightarrow x + y = 33$

$$\begin{cases} x + y = 33 \\ 480x + 600y = 12000 \end{cases}$$

$$\begin{cases} 4x + 4y = 92 \\ 4x + 6y = 120 \end{cases} \Rightarrow -2y = -28 \quad y = 14$$

$x = 19$