

$$I \quad 300 = 10X + 20Y$$

$$U = f(X, Y) = X^{\frac{2}{3}} Y^{\frac{1}{3}}$$

$$\text{Max } U = f(X, Y) = X^{\frac{2}{3}} Y^{\frac{1}{3}}$$

$$MRS_{XY} = \frac{\frac{2}{3} X^{-\frac{1}{3}} Y^{\frac{1}{3}}}{\frac{1}{3} X^{\frac{2}{3}} Y^{-\frac{2}{3}}} = \frac{P_X}{P_Y} = \frac{10}{20}$$

$$Y = \frac{1}{4}X \quad X=20 \quad Y=5$$

$$II \quad U = f(X, Y) = X + 3Y$$

$$\text{Max } U = f(X, Y) = X + 3Y$$

$$MRS_{XY} = \frac{1}{3} < \frac{P_X}{P_Y} = \frac{10}{20} = \frac{1}{2}$$

$$X=0 \quad Y=15$$

$$III \quad U = f(X, Y) = \min(X, Y)$$

$$\text{Max } U = f(X, Y) = \min(X, Y)$$

$$Y = X$$

$$X = Y = 10$$

每週會購買 10 杯奶茶 10 個漢堡

2.

$$400X + 600Y = 15000$$

$$U = X^{\frac{1}{2}} Y^{\frac{1}{2}}$$

$$MRS_{XY} = \frac{\frac{1}{2} X^{-\frac{1}{2}} Y^{\frac{1}{2}}}{\frac{1}{2} X^{\frac{1}{2}} Y^{-\frac{1}{2}}}$$