

PRACTICE 3 - MICROECONOMICS

Bachelor Degree in Global Governance

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THE OPTIMAL BUNDLE

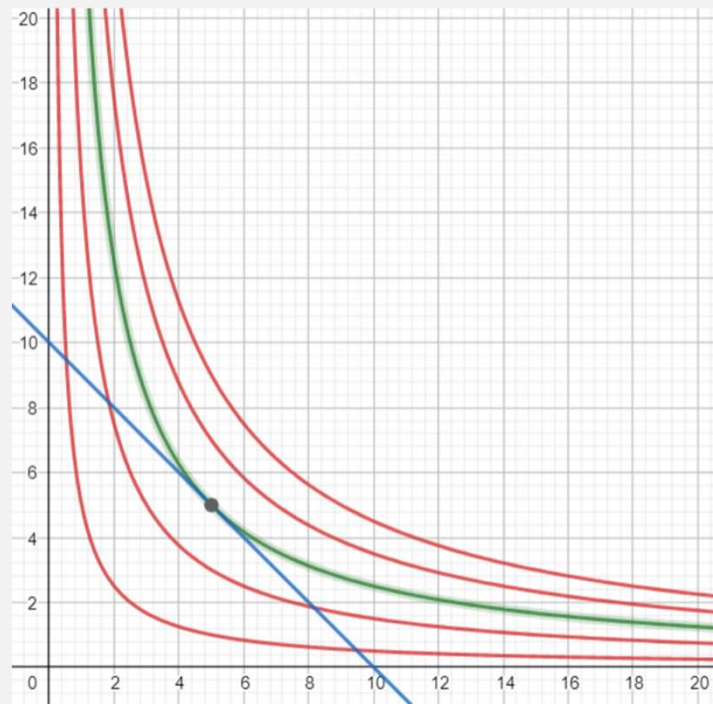
- The consumer's optimal bundle is the point at which the individual being analyzed enjoys the greatest utility he can achieve given his/her budget constraint, so he/she is as happy as possible with respect to what his/her economic resources are.
- From the theory, we know we have to solve the following system of equations:

$$MRS = \frac{p_1}{p_2} \text{ (tangency condition)}$$

$$I = p_1x_1 + p_2x_2 \text{ (budget constraint)}$$

- The first equation expresses the tangency condition between all the indifference curves and all the budget constraints with the ratio of prices, while the second equation anchors the tangency condition to the specific situation of the consumer we are analysing with the budget constraint.

THE OPTIMAL BUNDLE



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- **Exercise:** Given the following utility function

$$U(x_1, x_2) = x_1^{\frac{1}{2}} x_2^{\frac{1}{2}}$$

- i. Indicate the optimal choice of a consumer whose income is $I = 200$ in a market where the prices of the goods 1 and 2 are $p_1 = p_2 = 10$.
- ii. The price of good 1 decreases to $p_1 = 7$. How do the optimal quantities change?

UTILITY MAXIMIZATION AND INDIVIDUAL DEMAND

Exercise: Given a generic Cobb-Douglas utility function

$$U(x_1, x_2) = Ax_1^\alpha x_2^\beta$$

Calculate the optimal demands for the two goods

→ We start from the usual system:

$$\begin{aligned} MRS &= \frac{p_1}{p_2} \\ I &= p_1 x_1 + p_2 x_2 \end{aligned}$$

→ We compute the MRS as $\frac{MU_1}{MU_2}$ and we solve the system

UTILITY MAXIMIZATION AND INDIVIDUAL DEMAND

The demand for the two goods is, then,

$$x_1(I, p_1, p_2) = \frac{I}{p_1} \left(\frac{\alpha}{\alpha + \beta} \right)$$
$$x_2(I, p_1, p_2) = \frac{I}{p_2} \left(\frac{\beta}{\alpha + \beta} \right)$$

→ The demand for a good (e.g. x_1) decreases as the price of the good increases (e.g. p_1), that is, the direct price elasticity of demand is negative

→ The demand for a good increases as income I increases, i.e., the elasticity of demand to income is positive

→ The demand for a good (e.g. x_1) is independent from the price of the other good (e.g. p_2), that is, the cross-price elasticity of demand is zero

ADDITIONAL EXERCISES

- **Exercise I:** Given the following utility function

$$U(x_1, x_2) = 2 \ln(x_1) + 3 \ln(x_2)$$

- i. the equation of a generic indifference curve,
- ii. the equation of the indifference curve relative to the utility level $\bar{U} = 6$,
- iii. the slope of the indifference curves,
- iv. Indicate the optimal choice of a consumer whose income is $I = 300$ in a market where the prices of the goods 1 and 2 are $p_1 = 20, p_2 = 30$,
- v. The price of good 1 decreases to $p_1 = 15$. How do the optimal quantities change?

ADDITIONAL EXERCISES

- **Exercise 2:** Given the following utility function

$$U(x_1, x_2) = x_1 x_2^2$$

- i. the equation of a generic indifference curve,
- ii. the equation of the indifference curve relative to the utility level $\bar{U} = 4$,
- iii. the slope of the indifference curves,
- iv. Indicate the optimal choice of a consumer whose income is $I = 60$ in a market where the prices of the goods 1 and 2 are $p_1 = 3, p_2 = 3$,
- v. The price of good 1 increases to $p_1 = 5$. How do the optimal quantities change?

ADDITIONAL EXERCISES

- **Exercise 3:** A consumer has the following utility function:

$$U(x_1, x_2) = x_1^{\frac{2}{5}} x_2^{\frac{3}{5}}$$

The consumer has 200 euros to spend. The prices are $p_1 = 20$ euros and $p_2 = 30$ euros.

- Find the equation of a generic indifference curve,
- the equation of the indifference curve relative to the utility level $\bar{U} = 5$,
- the slope of the indifference curves,
- Indicate the optimal choice of the consumer,
- The income of the consumer doubles to 400 euros. How do the optimal quantities change?

ADDITIONAL EXERCISES: SOLUTIONS

- **Exercise I:**

i. $x_2 = \frac{e^{\frac{\bar{U}}{3}}}{x_1^3}$

ii. $x_2 = \frac{e^2}{x_1^3}$

iii. $-\frac{2x_2}{3x_1}$

iv. (6,6)

v. (8,6)

ADDITIONAL EXERCISES: SOLUTIONS

- **Exercise 2:**

i. $x_2 = \left(\frac{\bar{U}}{x_1}\right)^{0.5}$

ii. $x_2 = \frac{2}{(x_1)^{0.5}}$

iii. $-\frac{x_2}{2x_1}$

iv. $\left(\frac{20}{3}, \frac{40}{3}\right)$

v. $\left(4, \frac{40}{3}\right)$

ADDITIONAL EXERCISES: SOLUTIONS

- **Exercise 3:**

i. $x_2 = \frac{U^{\frac{5}{3}}}{2 x_1^{\frac{3}{2}}}$

ii. $x_2 = \frac{5^{\frac{5}{3}}}{2 x_1^{\frac{3}{2}}}$

iii. $-\frac{2}{3} \frac{x_2}{x_1}$

iv. (4,4)

v. (8,8)