

International Trade Problem Set #1

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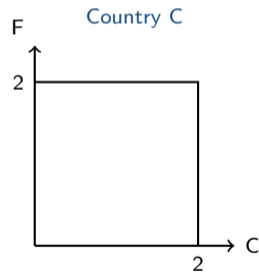
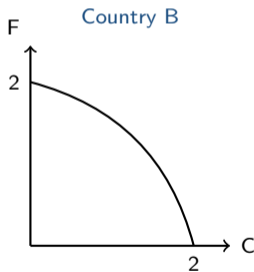
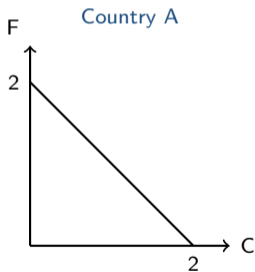


INTRODUCTION

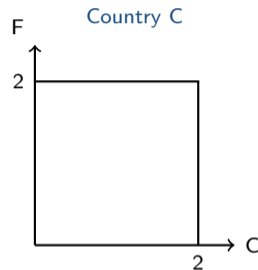
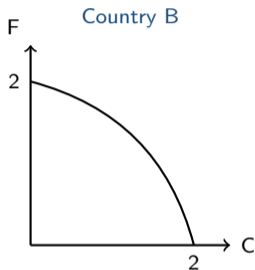
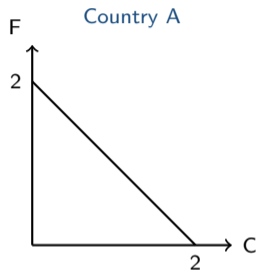
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 - ▶ It's better to ask me, than the professors.

EXERCISE 1

The following graphs show the production possibility frontiers (PPF) of three different countries (country A, country B and country C). The X-axes show production of clothing (C) and the Y-axes show production of food (F).



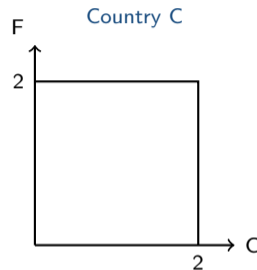
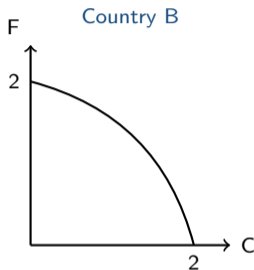
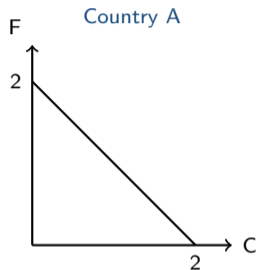
EXERCISE 1



a) What is the PPF?

The production possibility frontier shows all output combinations a country can produce if it is maximising the combined output given the resource constraint.

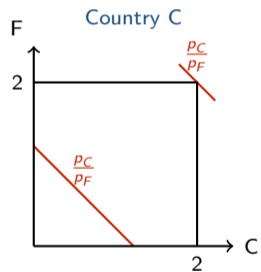
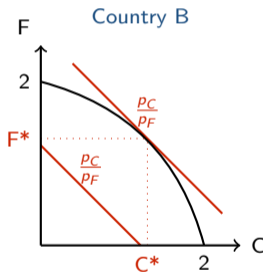
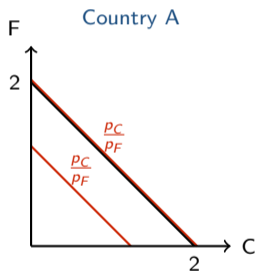
EXERCISE 1



- b) The slope of the PPF is called the **marginal rate of transformation (MRT)**. Explain in words what the marginal rate of transformation tells you. What is the marginal rate of transformation in each country?
- ▶ The MRT is the (absolute) slope of the PPF. In our case it shows by how many units the production of food must be decreased if one additional unit of clothing is to be produced.
 - ▶ In country A the MRT is one, in country B it is increasing in C and in country C it is not well defined.

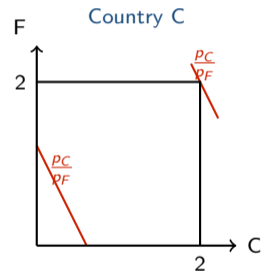
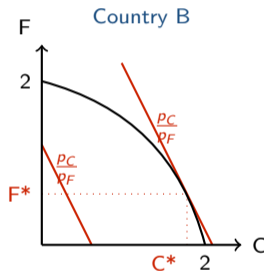
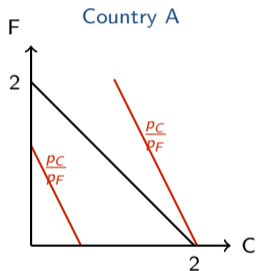
EXERCISE 1

- c) Suppose all countries trade in world markets. The world price of clothing is given by $P_C = 1\$$ and the world price of food is given by $P_F = 1\$$. Draw the isovalue lines and show for each country which amount of clothing and food it produces. (you just need to show it graphically)



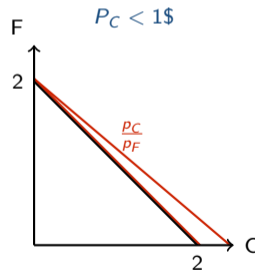
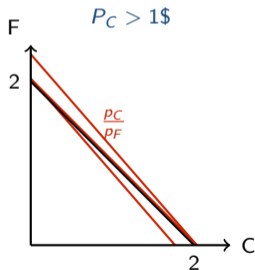
EXERCISE 1

- d) Now suppose the world price of clothing increases to $P_C = 2\$$ while the price of foods remains the same. Show how this affects production of clothing and food in each country.



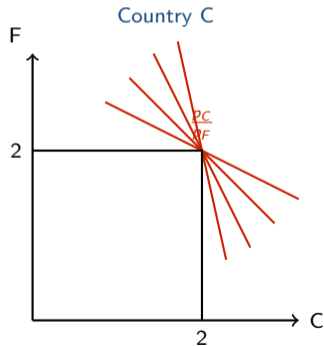
EXERCISE 1

- e) Given the world price of food of $P_F = 1\$$, for which world price of clothing will country A produce only clothing? For which will it produce only food?
- ▶ Produce only clothing: If $P_C > 1\$$
 - ▶ Produce only food: If $P_C < 1\$$
 - ▶ Shown graphically:



EXERCISE 1

- f) Will country C always produce both goods, no matter what the world prices are?
- ▶ Yes!
 - ▶ Shown graphically
 - ▶ What if the price of one good is zero?

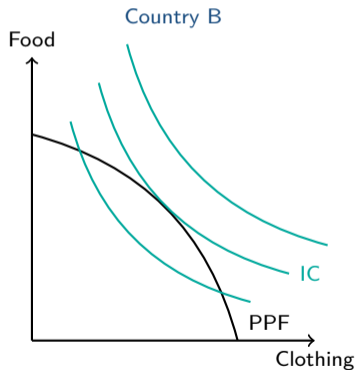


EXERCISE 1

- g) With the PPF and the isovalue line we can tell which amount of clothing and food each country produces. Can we tell which amount of clothing and food each country consumes?
- ▶ Depends.
 - ▶ Under autarky each country consumes what it produces. The preferences and production possibilities will determine the price ratio.
 - ▶ If there is trade, then we need to know the preferences in order to find the consumption level of each country.

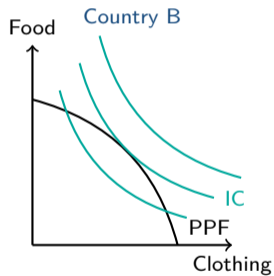
EXERCISE 2

The following graph shows the PPF and indifference curves (IC) for country B.



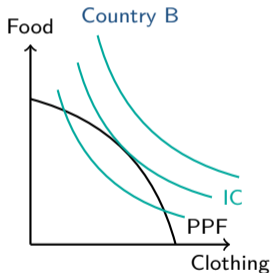
EXERCISE 2

- a) What are indifference curves?
- ▶ An indifference curve shows all the consumption bundles for which the consumer achieves a specific utility level.



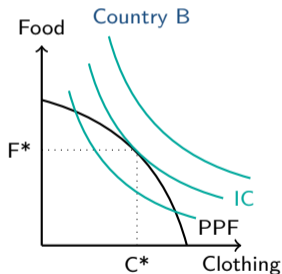
EXERCISE 2

- b) The slope of indifference curves is called **marginal rate of substitution (MRS)**. Explain in words what the marginal rate of substitution tells you.
- ▶ The marginal rate of substitution tells you the amount of goods the consumer is willing to exchange for another good in order to keep a constant utility level.



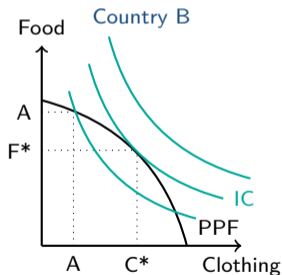
EXERCISE 2

- c) Suppose country B does not engage in trade (it lives in autarky). Show graphically which amount of clothing and of food country B produces, i.e. on which point on the PPF the country produces.
- ▶ The country will produce at the point where the indifference curve and the PPF are tangent.
 - ▶ Shown graphically:



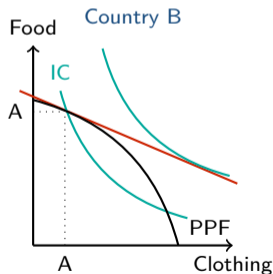
EXERCISE 2

- d) At the point where the country produces and consumes in autarky, it must hold that $MRS = MRT$. Explain intuitively why this condition must hold at the optimal production point.
- ▶ Suppose the country would produce at point (A, A) instead.
 - ▶ It is clear that the country is better off by producing at the tangency point of the IC and the PPF.
 - ▶ Why don't they produce on the outer indifference curve?



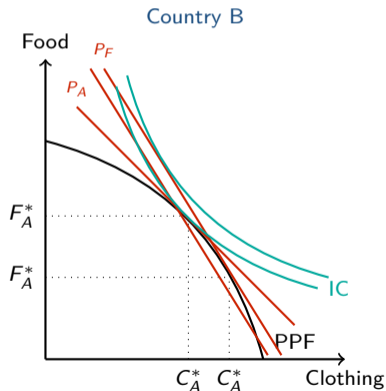
EXERCISE 2

- e) The relative price of clothing to food is denoted by $\frac{P_C}{P_F}$. Explain intuitively why it must hold that $MRS = \frac{P_C}{P_F}$ at the point where the country produces and consumes in autarky. (what would happen if this condition did not hold?)
- ▶ Suppose the MRS would not be equal to the price ratio. Instead it would be tangent to the point A.
 - ▶ At these prices the consumer would be better off by consuming more clothing and less food.
 - ▶ However this consumption bundle is outside the production possibility set of the country and hence infeasible.



EXERCISE 2

- f) Suppose the world relative price of clothing to food is higher than the relative price of clothing in country B under autarky. Show graphically what happens in country B if the country opens up to trade. How does production and consumption change? Is it still true that $MRS = MRT$ under trade?

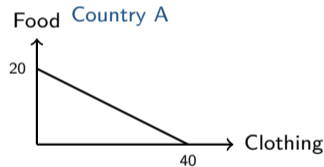


EXERCISE 2

- g) Do you think the following statement is true? *Whenever world relative prices of clothing and food are different than the relative prices that prevail in autarky, country B is better off if it engages in trade, rather than living in autarky.*
- ▶ Yes, the statement is true.
 - ▶ Does this mean that everybody is better off under trade?
 - ▶ No! Some people will benefit and some people will lose. But if there would be transfers then everybody could be strictly better off.

EXERCISE 3

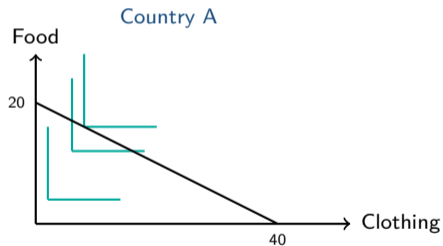
Suppose country A has the PPF shown in the following graph. This is a linear production function. It can produce at most 40 units of clothing or 20 units of food.



Suppose country A has very rigid taste patterns. Whatever the relative prices of clothing and food, people in this country always want to consume two units of food for each unit of clothing they consume (this type of preferences is called *Leontief-preferences*).

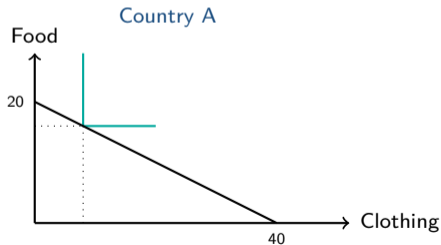
EXERCISE 3

- a) Draw indifference curves of country A
- ▶ $U(F, C) = \min\{F, 2C\} \Rightarrow F = 2C$



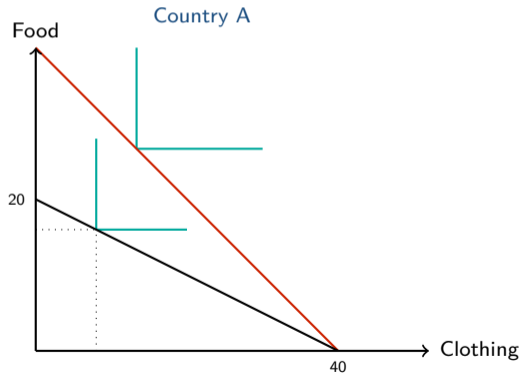
EXERCISE 3

- b) How many units of food and clothing does the country produce and consumer under autarky? What is the price of clothing relative to food?
- ▶ $U(F, C) = \min\{F, 2C\} \Rightarrow F = 2C$
 - ▶ PPF: $F = 20 - \frac{1}{2}C$
 - ▶ $C=8, F=16$
 - ▶ Price of clothing must be $1/2$.



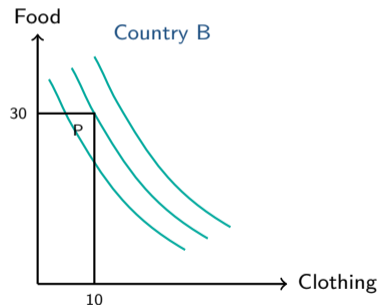
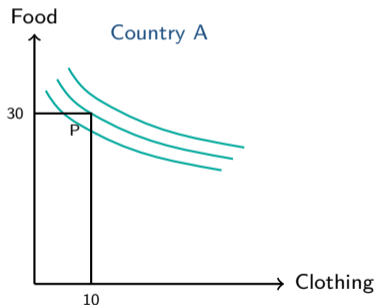
EXERCISE 3

- c) Suppose the country opens up to trade and the price of clothing relative to food on world markets is $\frac{P_C^*}{P_F^*} = 1$. Show how opening up to trade changes production and consumption in country A. Is the country better off with trade?



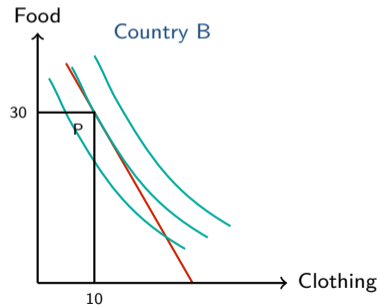
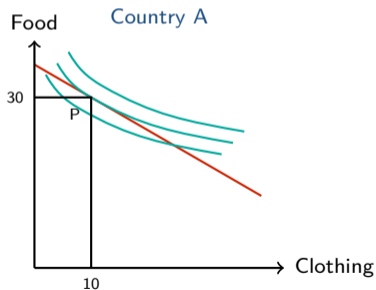
EXERCISE 4

Consider two countries that have the same PPF but different preferences, as shown in the following graph. Under autarky they produce and consume at point P.



EXERCISE 4

- a) Which country "likes clothing more"? Which country has the higher relative price of clothing (to food) under autarky?
- ▶ Country B likes clothing relatively more. We see this by noting that in country B, the individual must receive more food to be compensated for a loss of clothing.
 - ▶ Thus, the price of clothing is higher in country B.



EXERCISE 4

- b) Suppose the world consists only of these two countries. If the two countries open up to trade the world relative price of clothing is going to lie somewhere in between the two autarky prices. Show graphically how consumption in both countries change if they open up to trade. Are the countries better off with trade?

