

## **Microeconomics**

### **First Midterm Solutions**

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12.30-2pm

### **Warnings**

1. Calculators or any other electronic devices are not allowed.
2. No questions are answered during the test.

### **Honor's Commitment**

I declare that I will neither use nor contribute, directly or indirectly, to any illegal procedure or fraud during this test.

Signature: \_\_\_\_\_

**Good Luck!**

Name: \_\_\_\_\_ N°: \_\_\_\_\_

I  
(5)

Please state whether the following sentences are right or wrong and why: (max. 7 lines for each)

- (i) "Not all Giffen goods are normal goods"

**Giffen Goods:** Price  $\uparrow \Rightarrow$  Quantity demanded of that good,  $x \uparrow$  ( $\delta x / \delta p > 0$ )

**Normal Goods:** Income  $\uparrow \Rightarrow$  Quantity demanded of that good,  $x \uparrow$  ( $\delta x / \delta M > 0$ )

**Inferior Goods:** Income  $\uparrow \Rightarrow$  Quantity demanded of that good,  $x \downarrow$  ( $\delta x / \delta M < 0$ )

**Slutsky Equation:**  $\delta x / \delta p = \delta h / \delta p - x \delta x / \delta M$

If  $x$  is a giffen good, then  $\delta x / \delta p > 0$

We know  $\delta h / \delta p$  is always negative. Then,  $\delta x / \delta M$  has to be negative for  $x$  to be a giffen good and this means that  $x$  has to be an inferior good. Therefore, all giffen goods are inferior. The statement is **wrong**.

- (ii) "More is always better than less"

The statement is **wrong**: more is not always better.

Some counter examples: Bads, perfect complements, Satiation. The correct answer also requires explanation of the example given.

## II (15)

The preferences for different types of food products are different in distinct regions of the world. For instance, rice is very important in Asian diet. In contrast, in Europe there is no such special product.

Consider the preferences for rice and fish. Imagine that, depending on the region of the world, Asia or Europe, they can be represented by the following utility functions:

$$A=U(f,r) = \text{Min}\{6f, r\} \text{ and } B=U(f,r) = 0.6\log(f) + 0.4\log(r)$$

where  $f$  represents the quantity of fish and  $r$  the quantity of rice.

NOTE: Recall that  $\log(xy)=\log(x)+\log(y)$ , and that  $\log(x^a)=a \log(x)$ .

- (i) Explain why utility function A is more adequate to represent the preferences in Asia, while utility function B is more appropriate for Europe.

*A is Perfect Complements. Asians like to combine 1 unit of fish with 6 units of rice. That's why rice is important in Asia.*

*B is Cobb-Douglas. (log is a monotonic transformation). Europeans like to spend 60% of their income for fish and 40% for rice. It is more balanced than Asian diet.*

**Common mistakes:**

- A does not exactly imply that Asians like rice 6 times more than fish. This is a bit misleading.
- European does not buy 60% of fish and 40% of rice.

- (ii) If the Asians need at least 12 units of rice to survive, what is the minimum level of utility for survival?

*They always combine 1 unit of fish and 6 units of rice. Since at least 12 units of rice needed to survive, they combine it with 2 units of fish.*

*Minimum level of utility for survival is  $\min\{6 \times 2; 12\} = 12$ .*

**Common mistakes:**

- Minimum utility is 2 units of fish and 12 units of rice. This is not a utility, but bundle (or choice).

- They need 12 units of rice to survive and no fish. The utility level is then zero.

*In perfect complements they always combine goods. You can also see that the answer is not consistent with the utility function. For instance: if they choose 1 unit of fish and 6 units of rice, they have utility 6. They are happier than having (0,12), but they don't survive (and die).*

- (iii) If the price of rice is 2, the price of fish is 4, what is the minimum level of income they need? Represent the optimal choice for survival.

*To be able to survive they need 12 units of rice and 2 units of fish. Then they need the income to be:*

$$M = P_r r + P_f f$$

$$M = 2 \times 12 + 4 \times 2 = 32$$

- (iv) Recently, the prices of commodities have increased in the world market. In particular, the price of rice has doubled, that is, is now 4. Obtain the new optimal choice in Asia, assuming that the income has not changed.

*The optimality conditions are  $6f = r$  (they always combine 1 unit of fish with 6 units of rice) and the Budget Constraint. Substituting  $6f = R$  into BC gives:*

$$M = P_r (6f) + P_f f \quad \text{Leaving } f \text{ alone,}$$

$$f = M / (6P_r + P_f) \quad \text{Substituting the prices and income give:}$$

$$f = 32 / 28 = 8/7 \quad \text{The amount of rice will be six times more:}$$

$$r = 6 \times 32 / 28 = 192 / 28 = 48/7$$

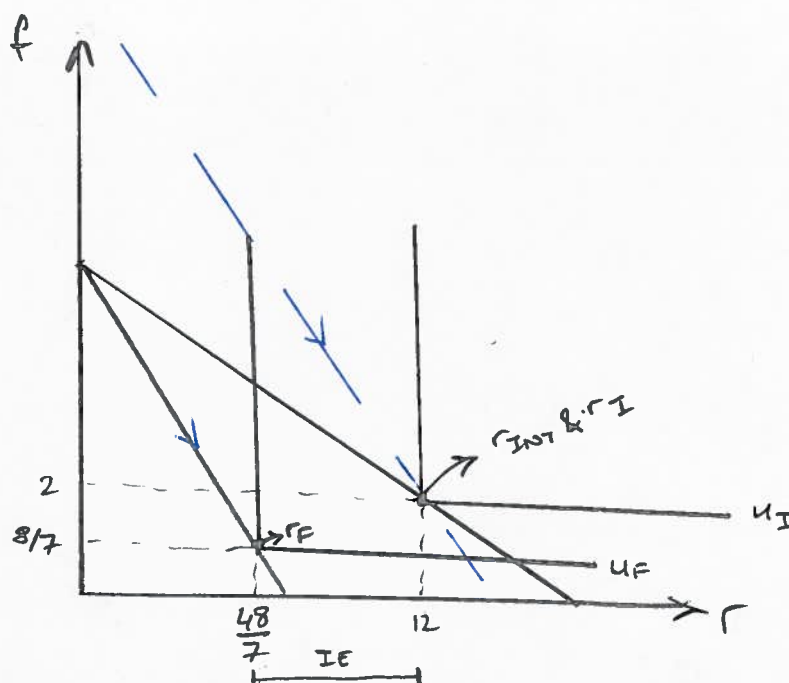
#### **Common Mistake:**

*They cannot afford (2,12) anymore. The bundle, (1,6), is affordable:  $32 > 4 \times 6 + 4 \times 1 = 28$ . So, the optimal choice is (1,6). This is not true, because there is still income left to spend and have a higher utility.*

- (v) After the increase in the price of rice, how can the Asian government guarantee survival? How do you measure the welfare loss? Illustrate graphically the substitution and income effects following the increase in the price of rice and explain briefly.

*The Compensating Variation Slutsky measures the Welfare Loss: the amount of subsidy allowing the consumers to buy the initial bundle at the new prices. CV Hicks is also accepted – they are equal at Perfect Complements.*

*Moreover, there is no substitution effect at Perfect Complement preferences. The only effect is the income effect, which is illustrated as follows:*



**Income Effect:**  $r_F - r_{INT} < 0$

**Substitution Effect:**  $r_{INT} - r_I = 0$

#### Common mistakes:

- The income and substitution effects depend on the good that its price changed, not the other good. In this case, it is rice, not fish.
- Drawing indifference curves for other utility functions.

Consider now the case of Europe.

- (vi) What is the optimal choice when the price of rice is 2, the price of fish is 4, and the income is 100?

*One way:  $|MRS_{f,r}| = P_f / P_r$  and substituting this condition into BC.*

*Another way: since Europeans have Cobb-Douglas utility function describing their preference, we can write directly the demand functions:*

$$f = 0,6 \times M / P_f = 0,6 \times 100 / 4 = 15$$

$$r = 0,4 \times M / P_r = 0,4 \times 100 / 2 = 20$$

- (vii) What is the more important good in relative terms in Europeans' diet? Why?

*The diet of people refers to their preferences. Since they spend 60% of their income for fish and only 40% for rice, fish is the more important good. (You could see this by the MRS)*

**Common mistake:**

*Comparing prices.*

(viii) Obtain the Engel curve for fish.

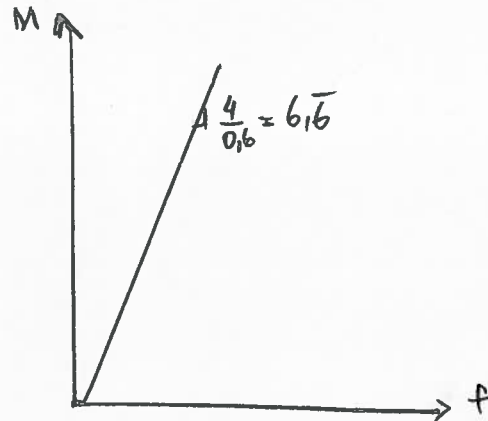
Engel curve shows the relation between the income and the quantity demanded. By the demand function of fish, we found:

$$f = 0,6 \times M / 4$$

If we have the income on the y-axis, then we can rewrite the demand to see the slope of the Engel curve for fish.

$M = 4 f / 0,6$ . Thus, the slope is  $4 / 0,6$ .

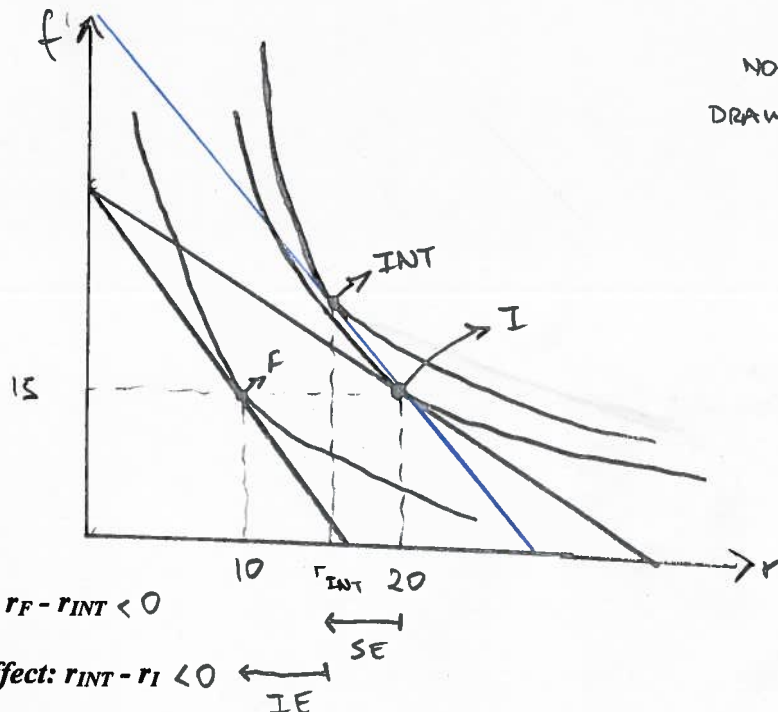
Graphically:



(ix) If the price of rice increases to 4, obtain the new optimal choice. Illustrate graphically the substitution and income effects following the increase in the price of rice.

Using the demand functions for goods: the new optimal choice is (15;10) for fish and rice, respectively.

Graphically:



(x) Is rice a normal good? Explain.

*By the demand function for rice, we can see that the quantity demanded increases with income.*

*Alternatively, you could argue again the Slutsky equation to see the relation of  $\delta x / \delta M$ .*