1102-Microeconomics

First Midterm

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5.-6.30pm

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!

Solution topics

Name: _____ N°: _____

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I
(5)

1.Research by economists on America's increasing obesity points to improved technology in the preparation of tasty and more caloric food as a possible explanation of weight gain. Before World War II, people rarely prepared French fries at home because of the significant amount of peeling, cutting, and cooking required. Today, French fries are prepared in factories using low-cost labor, shipped frozen, and then simply reheated in homes.

Paul consumes two goods: potatoes and leisure, N. The number of potatoes does not vary, but their tastiness, T, does. For each extra unit of tastiness, he must spend $p_T = 4$ hours in the kitchen. Thus, Paul's time constraint is $N + p_T T = 24$. Paul's utility function is $U = TN^{0.5}$.

(i) What is Paul's marginal rate of substitution between N and T?

$$MRS_{N,T} = -\frac{Mg\,N}{Mg\,T} = -\frac{0{,}5N^{-0{,}5}T}{N^{0{,}5}} = -\frac{T}{2N}$$

(ii) What is Paul's optimal choice?

$$\begin{cases} |MRS_{N,T}| = \frac{P_N}{P_T} \\ P_N N + P_T T = 24 \end{cases} \Leftrightarrow \begin{cases} \frac{T}{2N} = \frac{1}{P_T} \\ N + P_T T = 24 \end{cases} \Leftrightarrow \begin{cases} N = 0{,}5 P_T T \\ 0{,}5 P_T T + P_T T = 24 \end{cases}$$

$$\Leftrightarrow \begin{cases} N = 0{,}5 P_T \frac{24}{1{,}5 P_T} \\ T = \frac{24}{1{,}5 P_T} \end{cases} \Leftrightarrow \begin{cases} N = 8 \\ T = 4 \end{cases} \qquad (N^*, T^*) = (8, 4)$$

OR They are Cobb-Douglas, so:

$$N^* = \frac{0{,}5}{0{,}5+1}\frac{M}{P_N} = 8 \quad ; \quad T^* = \frac{1}{0{,}5+1}\frac{M}{P_T} = 4$$

(iii)Obtain Paul's optimal choice following the decrease in the price of taste (the ability to produce a given level of tastiness faster) to $p_T = 2$. Does Paul consume more taste (and hence gain weight) or spend more of his time in leisure? Does a decrease in the price of taste contribute to weight gain? Explain.

$P_T' = 2$

$$\begin{cases} \frac{T}{2N} = \frac{1}{P_T'} \\ N + P_T' T = 24 \end{cases} \Leftrightarrow \begin{cases} N^* = 8 \quad (\downarrow) \\ T^* = \frac{16}{P_T'} = 8 \quad (\uparrow) \end{cases}$$

As taste increases, he gains weight

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II
(10)

2. When Bryan goes jogging, he can either take water (W) or a sports drink (S) with him to drink. Since the sports drink has more nutrients, Bryan believes that it helps him recover three times as fast as water.
Bryan has a 30€/month budget to spend on these two drinks. A bottle of water costs (P_W) 1€ while each sports drink costs (P_S) 2€.
A utility function that represents Bryan's preferences is given by

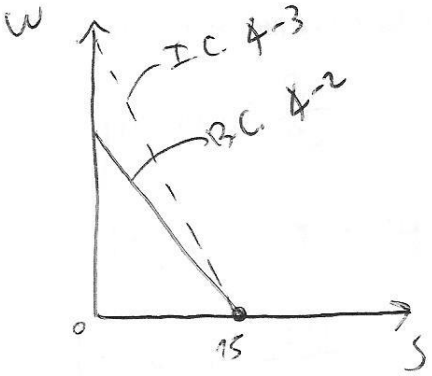
$$U = aS + bW$$

(i) What are the values for a and b? Explain why.

$a=3$; $b=1$
Since the marginal utility of S is three times higher than W.

NOTE: In case you are not able to answer (i), in what follows, take a=6, and b=2.

(ii) What is Bryan's optimal choice? Represent it graphically in the (S,W) space. State the demand functions for both goods, given those prices.

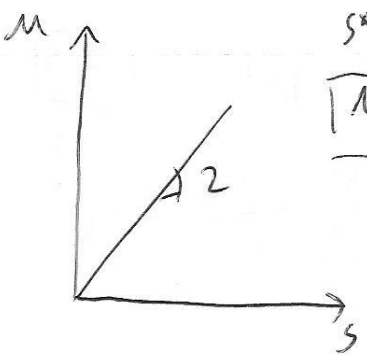


$S^x = \frac{M}{P_S}$

$W^x = 0$

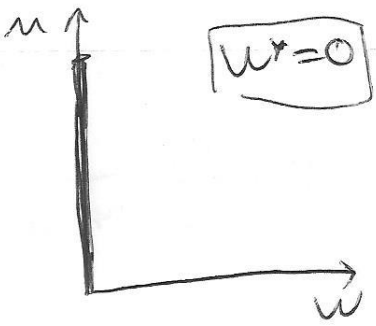
$(S^x, W^x) = (15, 0)$

(iii) Determine and represent graphically the Engel curve for each good.



$S^x = \frac{M}{2}$ (=)

$M = 2S^x$

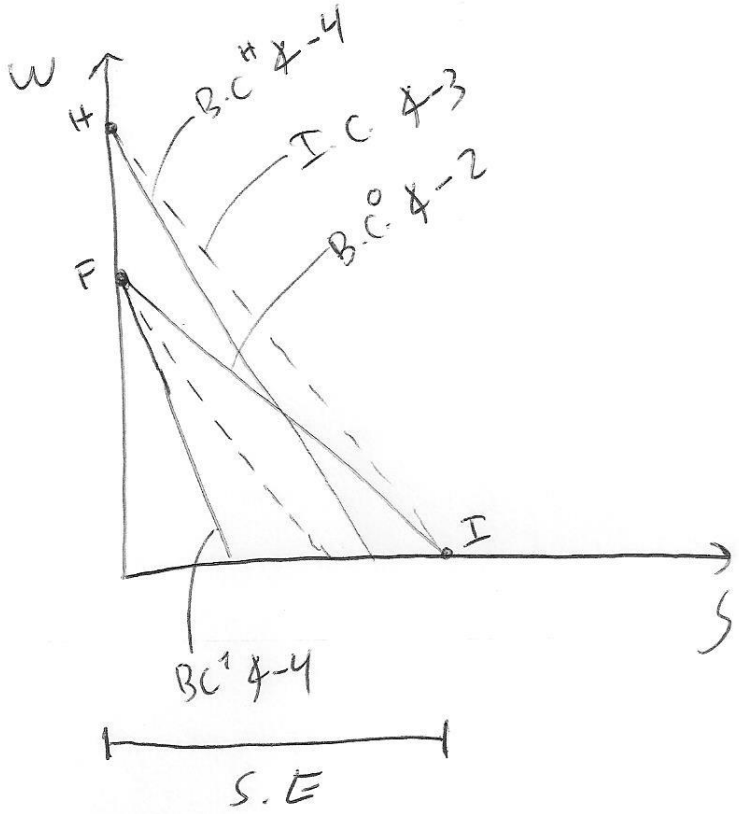


$W^x = 0$

Sports drinks became so famous that the price of each bottle increased to 4€.

(iv)What is the new optimal choice? Decompose graphically this variation into Hicksian substitution and income effect.

$(S^*, W^*) = (0, 30)$



NO Income effect

(v) What is the minimum subsidy Bryan would accept to be compensated for this increase in price? State the name of this welfare measure.

Hicksian compensated variation

$U^I = 35 + w = 3 \times 15 + 0 = 45$

$45 = 35^* + w^*$ at final prices

$45 = 3 \times 0 + \frac{M'}{P_S = 1} \quad (=) \quad M' = 45$

$\Delta M = M' - M = 45 - 30 = 15$

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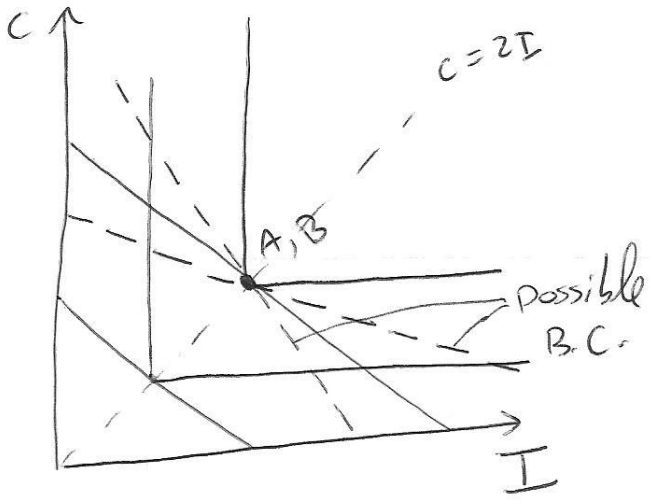
III
(5)

3. Jean always consumes 2 coffees and one ice-cream.

(i) Write down a utility function that represents Jean´s preferences. Explain your choice.

$U(C,I) = \min\{C; 2I\}$

(ii) In the first year, Jean picks an optimal bundle of coffee and cream, A. In the second year, inflation occurs, the prices of coffee and cream change by different amounts, and Jean receives a cost-of-living adjustment based on the consumer price index for these two goods. After the price changes and she receives the cost-of-living adjustment, her new optimal bundle is B. Illustrate graphically the two equilibria. Is she better off, worse off, or equally well off at B compared to A? Explain why.



A is affordable under a cost-of-living adjustment. Since there is no substitution effect he is equally well off at B compared to A.