

73-250 - Intermediate Microeconomics

Recitation # 2 - January 26, 2001

Exercise #1. Some years ago cognitive psychologists started studying how the way different alternatives are presented to individuals affects their choices. Consider the following experimental study. Consumers were asked how they would behave in the following two situations:

- (a) “You are in a store. You are about to buy a stereo for 200\$ and a calculator for 15\$. The salesperson lets you know that the calculator is on sale for 6 dollars less at the other branch of the store. The other branch is located 20 minutes away. The stereo has the same price there. Would you make the trip to the other store?”
- (b) “You are in a store. You are about to buy a stereo for 200\$ and a calculator for 15\$. The salesperson lets you know that the stereo is on sale for 6 dollars less at the other branch of the store. The other branch is located 20 minutes away. The calculator has the same price there. Would you make the trip to the other store?”

The result of such study showed that the fraction of consumers that would answer “Yes” to question (a) was much higher than the fraction of consumers that would answer “Yes” to question (b). Thus, despite the fact that both the discount and the distance of the other branch of the store were the same in situations (a) and (b), significantly more consumers would choose to go to the second branch if the discount was on the calculator than if it was on the stereo.

The researchers went on and asked the same group of consumers the following question:

“In the first branch of the store there are no more stereos or calculators. To get them you have to travel to the other branch that is located 20 minutes away. To make up for this inconvenience, you will receive a 6 dollars discount on either the stereo or the calculator. Do you care about which item will be sold to you at a discount?”

Most consumers answered “No” to this second question.

Now, consider a consumer that, in the first situation, answered “Yes” to (a) and “No” to (b). Suppose that this consumer answered “No” to the second question.

Can you show formally that this consumer’s preferences are not transitive? [Hint. Consider the following three alternatives: X = buy the two items in the first branch of the store; Y = go to the second branch of the store and get the 6\$ discount on the stereo; Z = go to the second branch of the store and get the 6\$ discount on the calculator. What do we know about the consumer’s preferences between X and Z , X and Y , and Y and Z ?]

Exercise #2. A marketing researcher is trying to find a utility function which summarizes Jim’s preferences over consumption bundles of the form (x_1, x_2) , where x_1 is the amount of good 1 that Jim consumes and x_2 is the amount of good 2 that Jim consumes. The researcher gives Jim a series of choices between pairs of bundles. Jim makes the following choices:

Bundle #1	Bundle #2	Jim's Preference
(2,2)	(1,1)	Prefers #1
(2,2)	(3,1)	Prefers #1
(1,3)	(7,1)	Indifferent
(1,5)	(3,1)	Prefers #1

Determine which, if any, of the following utility functions are consistent with these choices. For each case, support your answer with a convincing argument:

(a) $U(x_1, x_2) = x_1 x_2^3$

(b) $U(x_1, x_2) = x_1 + 3x_2$

(c) $U(x_1, x_2) = \ln(x_1) + 3\ln(x_2)$. Answer this one without evaluating Jim's utility at the different consumption bundles.

Exercise # 3. Mark is an environmentalist that lives in Vermont. He cares about clean air in his state, but is also aware of the fact that production of electricity is necessary to guarantee a minimum quality of life to its inhabitants. His philosophy on this matter is summarized by the following statement which has been recently reported by the Burlington Gazette: "I am not a strict environmentalist, I am willing to give up some clean air in our state for more production of electricity, up to a point. After we have satisfied our basic energy needs, say by producing 4000 Kw-hr/year (kilowatt hours per year) per inhabitant, we should give absolute priority to clean air and the environment. When our basic energy needs have been satisfied, I am not willing to sacrifice clean air for more power".

Mark's preferences, when electricity production exceeds 4000 Kw-hr/year, are called lexicographic. A lexicographic preference relation \succ is such that:

$$(x_1, x_2) \succ (y_1, y_2) \text{ if } x_1 > y_1, \text{ or if } x_1 = y_1 \text{ and } x_2 > y_2.$$

(a) Can you explain in words why Mark's preferences can be represented in this way, when electricity production exceeds 4000 Kw-hr/year? [Hint: call good 1 clean air (as measured by some index), and good 2 production of electricity in excess of the amount 4000 Kw-hr/year.]

(b) Are these preferences monotonic?

(c) Are there two distinct bundles (x_1, x_2) and (y_1, y_2) , with $x_2, y_2 > 4000$ Kw-hr/year, such that Mark is indifferent between them?

(d) What do you conclude about the indifference curves associated with these preferences? [Hint: since the answer to the previous question is "No", indifference curves in this case do not exist.]

Exercise # 4. Consider the prime minister of Bahnanas. At the beginning of 1999 he is worried about the year's 2000 elections. He knows that the citizens of Bahnanas only care about these two "goods":

- x_d : thousands of dollars allocated to the payment of the national debt in 1999;

- x_h : the fraction of the cost of a visit to a doctor that is covered by the government's health plan (assuming each citizen will visit the doctor once in 1999). Notice that this variable is measured in percentage terms (e.g.: a value of 1 indicates 100% coverage).

The prime minister does not have much of an ideology. He prefers a policy bundle (x_d, x_h) to another policy bundle (\bar{x}_d, \bar{x}_h) if the number of votes he receives by implementing policy (x_d, x_h) is higher than the number of votes he receives by implementing policy (\bar{x}_d, \bar{x}_h) . The prime minister's campaign advisors have studied the voting behavior of the citizens of Bahnanas and have figured out that by implementing a policy (x_d, x_h) in 1999, the prime minister will receive in the 2000 elections the following number of votes (allowing for fractions of a vote):

$$V(x_d, x_h) = 1000 x_d^{\frac{1}{2}} x_h^{\frac{1}{2}}.$$

Thus, denoting the prime minister's preference relation by \succ , we have

$$(x_d, x_h) \succ (\bar{x}_d, \bar{x}_h) \text{ if and only if } V(x_d, x_h) > V(\bar{x}_d, \bar{x}_h).$$

(a) Are the prime minister's preferences convex? [Hint: show this by finding the equation that represents the prime minister's indifference curves; then draw one of them, and look at its shape to determine whether preferences are convex or not.]

(b) The prime minister's advisors come up with two re-election plans: 1) the "fiscally conservative" plan suggests the prime minister to choose the policy bundle (4,0.25); 2) the "free-health-for-everybody" plan suggests the prime minister to choose the policy bundle (1,1). The prime minister argues that probably the moderate plan (2.5,0.625) will capture more votes (and make him a happier man) in the 2000 elections than any of the other two plans. Is he right? Answer without evaluating the (2.5,0.625) point in $V(x_d, x_h)$.

(c) An advisor to the prime minister has computed that his MRS between x_h and x_d is

$$\text{MRS}(x_d, x_h) = -\frac{x_h}{x_d}.$$

Suppose that the prime minister is considering policy (2.5,0.625). At that policy, by how much is he willing to reduce payment of the national debt in order to marginally increase health coverage?