

## Home assignment: Advanced Microeconomic Analysis

September 20, 2011, by Jerker Holm

1. Consider the indirect utility function  $v(p, m)$ , where  $p$  is a price vector and  $m$  is income.

a) Explain shortly how  $v(p, m)$  is derived.

b) Prove that (under normal assumptions) that: *i*)  $v(p, m)$  is non-decreasing in  $m$  *ii*) and homogenous of degree 0.

2. There are two urns: 1 and 2. Urn 1 contains 30 red balls and 30 white balls. Urn 2 contains 60 balls that are black or green, but in unknown proportions. Anna, Bart and Chris can choose between gambles from these urns. They can choose between the following gambles:

Gamble A: To receive \$500 if the ball is white (when drawn from Urn 1).

Gamble B: To receive \$500 if the ball is black (when drawn from Urn 2).

Gamble C: To receive \$500 if the ball is not white (when drawn from Urn 1).

Gamble D: To receive \$500 if the ball is green (when drawn from Urn 2).

When asked the following preferences are observed:

Anna:  $A \succ B$  and  $D \succ C$ . Bart:  $A \succ B$  and  $C \succ D$ . Chris:  $B \succ A$  and  $C \succ D$ .

a) Analyze if these preferences violate the properties of expected utility. Motivate your answer carefully.

b) Now, assume that gamble B is slightly changed to the following: "To receive \$600 if the ball is black (when drawn from Urn 2)." If it is assumed that Anna, Bart and Chris have the same preferences (as described above) after this change, does this affect your analysis and conclusions?

3) A monopolist applies third degree price discrimination. The inverse demand curves are given by  $p_1(x_1)$  and  $p_2(x_2)$ , the cost function is given by  $c(x_1, x_2) = 30x_1 + 30x_2$ .

Suppose that the price elasticity of demand at the optimal quantities are -1,6 and -2,5 in market 1 and 2, respectively. Furthermore, assume that  $p_1(x_1)$  and  $p_2(x_2)$  are linear. Based on this information, analyze if it is possible to determine:

i) the optimal prices. ii) the optimal profit level. iii) an inverse demand function,  $p_1(x_1)$ , consistent with this optimal solution.

Whenever possible, determine optimal prices, profit levels, and an inverse demand function,  $p_1(x_1)$ .

*The answers should be handwritten and handed in to Jerker Holm no later than September 29 at 12.00. The assignment can be handed in during the lecture on September 29 or put in an envelope marked "Jerker Holm" that is dropped in the mailbox outside the Department of Economics (4<sup>th</sup> floor) in the Alfa building. Please, do not forget to write your own name and personal ID number on the assignment.*