

14.121 Problem Set #5

Due October 19, 2005

1. MWG Exercise 3.I.2 (page 86).
2. Goods  $i$  and  $j$  are said to be “substitutes” (at  $(p, u)$ ) if  $\frac{\partial h_i}{\partial p_j}(p, u) \geq 0$ .
  - (a) If goods  $i$  and  $j$  are substitutes at  $(p, u)$  is it always the case that goods  $j$  and  $i$  are substitutes at  $(p, u)$ ?
  - (b) Give an example of two goods for which it is plausible to think that they would be substitutes for a consumer at one price and not substitutes at another price.
  - (c) By considering what happens when the price of good  $i$  increases (and using the symmetry of the Slutsky matrix) show that every good has at least one substitute.
  - (d) Assume that coffee and tea are substitutes at all  $(p, u)$ . How does the amount a consumer will pay to avoid being deprived of tea altogether depend on whether or not coffee is available? Prove your answer.
3. Consider a consumer with indirect utility function  $v(p_1, p_2, I) = I/\sqrt{p_1 p_2}$ .
  - (a) What is the consumer’s expenditure function?
  - (b) What are the consumer’s Hicksian demand functions?
  - (c) Suppose that the consumer initially has  $I = 400$  and the prices are  $p_1 = p_2 = 100$ . What would the compensating variation be if  $p_1$  increases to 400?
  - (d) Compute Paasche and Laspeyres price indexes for this price change. How do they compare with the cost-of-living adjustment suggested by the compensating variation?
4. Consider a monopolist with cost function  $c(q) = cq$ . Use a simple revealed preference argument to show that the monopolist’s output is weakly decreasing in  $c$ . (One can do this very generally without making any assumptions about the demand curve.)

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