## PROBLEM SET 4

## ETHAN LIGON

Questions marked  $(\mathbf{T}, \mathbf{F}, \mathbf{U})$  should be answered "True," "False," or "Uncertain," and your answer should be briefly justified. Note that points will be awarded based only on your reasoning, not on the answer itself, even if correct.

- (1) (**T**,**F**,**U**) At the intersection of a Marshallian demand curve and the corresponding Hicksian demand curve, the Marshallian demand is always more elastic with respect to the own price than the Hicksian demand, since Marshallian demand depends on income effects.
- (2) (**T**,**F**,**U**) Suppose that a consumer's utility from wine and cheese is given by  $U(w,c) = \min(w,c)$ . Marshallian demands aren't defined for this consumer, since his utility function is not differentiable.
- (3) (**T,F,U**) Anna's Hicksian and Marshallian demand curves for milk are likely to be almost identical, but might very well not be for housing.
- (4) (T,F,U) If the own-price elasticity for Washington apples in California is estimated to be -0.55, an increase in the price of Washington apples will increase the total sale revenue of Washington apples in California.
- (5) David has the utility function  $U(q_1, q_2) = \log q_1 + 3 \log q_2$ .
  - a) His income is Y, and the prices are  $p_1$  and  $p_2$  for the two goods respectively. Solve his utility maximizing level of consumption of  $q_1$  and  $q_2$ . Derive the Marshallian demand function for both goods.
  - b) Find the indirect utility function. Suppose that David now must reach a utility level of at least  $U_0$ . order to meet his objective.
  - c) State the dual problem to the one initially posed.
  - d) Solve the dual for the optimal level of  $q_1$  and  $q_2$ . Derive his Hicksian demand functions for  $q_1$  and  $q_2$ . Explain.

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(6) Mr. Pigou has a utility function:

$$U = X * Y$$

and an income of 1,000 dollars. The initial price of X of 10 dollars/unit and price of Y of 15 dollars/unit. If the price of X increases to 15 dollars,

- a) What was the initial utility maximizing quantity of X and Y?
- b) What is the new utility maximizing quantity of X and Y following the increase in the price of X?
- c) What is the Hicks compensating variation in income that would leave this person equally well off following the price increase? What is the Slutsky compensating variation in income?
- d) Calculate the pure substitution effect and the real income effect on X of this increase in the price of X. Distinguish between the calculation of these effects using the Hicksian analysis vs. the Slutsky analysis.