Universidad Católica del Norte, Economic Department

Microeconomics: Midterm

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May 13, 2016

Some comments:

- If you believe a question is unclear, please state how you interpret the question.
- Please, use formal mathematical language wherever possible.
- You must show all work for partial credit to be awarded.
- Total points: 60.

1 Theory

1. Consider the following preferences: $(x_1, x_2) \succcurlyeq (y_1, y_2)$ if $x_1 \geq y_1 - 1$ and $x_2 \leq y_2 + 1$.
   a) (3 points) Find the upper, lower and indifference contour set of this preference.
   b) (3 points) Is this preference complete?
   c) (3 points) Is this preference reflexive?
   d) (3 points) Is this preference continuous?
   e) (3 points) Is this preference monotone?
2. (6 points) Prove the following statement: *"If $\succcurlyeq$ is convex, then the set of solutions for a choice from $B(\boldsymbol{p}, y)$ is convex".*
3. Let the choice set be $X = \mathbb{R}^2_+$ and consider utility function $u(\boldsymbol{x}) = \ln\left(x_1^{\beta} \cdot x_2^{\gamma}\right)$, for $\beta, \gamma > 0$

- (2 points) Write down the Lagrangian for the Expenditure Minimization problem given prices $\boldsymbol{p} \in \mathbb{R}^2_+$ and utility level $u^0 > 0$.
- (7 points) Compute the Hicksian demand correspondence.
- (6 points) Let $\beta = \gamma = 1$. Compute the Equivalente Variation for a price change from $\boldsymbol{p}^0 = (1, 2)$ to $\boldsymbol{p}^1 = (2, 1)$ **using line integral techniques**.

4. (6 points) Assume a consumer expend all his money in three goods (1, 2 and 3). If you agree that the expenditure function satisfy all its properties, which of the following expression are true or false, where h_2 and h_3 are the hicksian demands for good 2 and 3, respectively.
   a) $\frac{\partial h_2}{\partial p_1} > 0$ and $\frac{\partial h_3}{\partial p_1} > 0$
   b) $\frac{\partial h_2}{\partial p_1} > 0$ and $\frac{\partial h_3}{\partial p_1} < 0$
   c) $\frac{\partial h_2}{\partial p_1} < 0$ and $\frac{\partial h_3}{\partial p_1} < 0$

2 Applied Section

1. (4 points) Suppose you are interested in estimating the compensating variation of crime. To do so, you estimate the following model:

$$U^*_{ij} = \alpha_1 C_j + \gamma \ln Y_i + \alpha_2 C_j \left(\ln Y_i - \overline{\ln Y_i} \right) + \epsilon_{ij}$$

   where U^*_{ij} is some measure of subjective well-being for individual i in region j and Y_i is income of individual i. Derive the estimator for the compensating variation and explain it.

2. Imagine that you are asked to evaluate the efficiency of a food stamps program in your country. You run a similar experiment to the San Diego experiment: in a given month you give cash to group G1 and food stamps to group G2. The total value of the transfer is \$100 per recipient in cash or food stamps. You observe that within group G1, 50% of the recipients increase their food consumption by \$100 and 50% of the recipients increase food consumption by \$60 and consumption of all other goods by \$40.
   a) (2 points) You conclude that $(60 - 40)/100 = 20\%$ of the transfers to G2 is wasted, thus the DWL of the food stamps is \$20 per \$100. Why this claim is incorrect.
   b) (2 points) Describe what information you would need to provide a correct estimate of the true DWL of the food stamp program.
   c) (4 points) Draw a set of diagrams that shows the budget set faced by food stamp recipients for food versus all other goods. Show the indifference curve for the 50% or recipients who would like to spend the full \$100 of stamps on food. Show the indifference curve for the 50% of recipients who would like to spend only \$60 on food but instead are required to spend \$100.

d) (6 points) Draw the compensated demand function for food for a hypothetical constrained and unconstrained food stamp recipient. Explain how the DWL loss of the food stamp program depends, in part, on the steepness of the compensated demand curve.