Recitation 1 – 08/24/2018

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1. **Checking properties of preference relations-I.** For each of the following preference relations in the consumption of two goods (1 and 2): describe the upper contour set, the lower contour set, the indifference set of bundle (2,1), and interpret them. Then check whether these preference relations are rational (by separately examining whether they are complete and transitive), monotone, and convex.
   a) Bundle (x_1,x_2) is weakly preferred to (y_1,y_2), i.e., $(x_1,x_2)\succsim (y_1,y_2)$ if and only if $x_1 \geq y_1-1$.
   b) Bundle (x_1,x_2) is weakly preferred to (y_1,y_2), i.e., $(x_1,x_2)\succsim (y_1,y_2)$, if $x_1 \geq y_1-1$ and $x_2 \leq y_2+1$.

2. **Lexicographic preference relation.** Let us define a lexicographic preference relation in a consumption set X×Y, as follows:

$$(x_1,x_2) \succsim (y_1,y_2) \; if \; and \; only \; if \begin{cases} x_1, & or \; if \\ x_1 = y_1 \; and \; x_2 \geq y_2. \end{cases}$$

   Intuitively, the consumer prefers bundle x to y if the former contains more units of the first good than the latter, i.e.,$x_1 > y_1$. However, if both bundles contain the same amounts of good 1, $x_1=y_1$, the consumer ranks bundle x above y if the former has more units of good 2 than the latter, i.e., $x_2 \geq y_2$. For simplicity, assume that both components have been normalized to X= [0,1] and Y= [0,1].
   a. Show that the lexicographic preference relation satisfies rationality (i.e., it is complete and transitive).
   b. Show that the lexicographic preference relation $\succsim$ cannot be represented by the utility function $u: X \times Y \rightarrow \mathbb{R}$.
   c. Assume now that this preference relation is defined on a finite consumption set $X=X_1\times X_2$, where $X_1=\{x_{11},x_{12},\ldots,x_{1n}\}$ and $X_2=\{x_{21},x_{22},\ldots,x_{2n}\}$.