Homework 1 – 08/31/2018

Instructor: Ana Espinola-Arredondo

1. Moana and Maui need to find the magical fish hook. Maui lost this weapon after stealing the heart of Te Fiti and his subsequent battle with the lava demon Te Kā. The fish hook was lost in sea, and eventually was found by Maui's arch-rival Tamatoa, who placed the fish hook on his shell as a prize. In order to find the hook they need to combine two techniques of navigation, that is, intense observation of (1) the celestial bodies in the sky (technique x) and (2) the swells of the water (technique y). Maui is an expert in the art of navigation, and he weakly prefers a combination of technique x and y that contains more of observation of the sky, i.e., $(x_1,y_1)\succsim(x_2,y_2)$ if and only if $x_1 \geq x_2+1$. For this preference relation in the use of navigation techniques (1 and 2): describe the upper contour set, the lower contour set, the indifference set of bundle (3,2), and interpret them. Then check whether this preference relation is rational (by separately examining whether they are complete and transitive), monotone, and convex.

2. Consider the following preference relation define in $X = \mathbb{R}^2_+$. A bundle (x_1,x_2) is weekly preferred to another bundle (y_1,y_2), that is, $(x_1,x_2)\succsim(y_1,y_2)$, if and only

$$\min\{3x_1 + 2x_2, 2x_1 + 3x_2\} \geq \min\{3y_1 + 2y_2, 2y_1 + 3y_2\}.$$

   a. For any given bundle, draw the upper contour set, the lower contour set, and the indifference set of this preference relation. Interpret.
   b. Check if this preference relation satisfies: (i) completeness, (ii) transitivity, and (iii) weak convexity.

3. Explain monotonicity and strong monotonicity in preference relations, and compare them. Provide an example where a bundle *x* is (strictly) preferred to bundle *y* when preferences satisfy strong monotonicity, but *x* is not necessarily preferred to *y* under monotonicity.

4. Let (B, C(▪)) be a choice structure where β includes all non-empty subsets of consumption bundles X, i.e., C(B) =Ø for all sets B ∈ β. We define the choice rule C(▪) to be distributive if, for any two sets B and B' in β, $C(B) \cap C(B') \neq \emptyset$ *implies that* $C(B) \cap c(B') = C(B \cap B')$ In words, the elements that the individual decision maker selects both when facing set B and when facing set B', $C(B) \cap C(B')$, coincide with the elements that he would select when confronted with the elements that belong to both sets $B \cap B'$, i.e., $C(B \cap B')$. Show that, if choice rule C(▪) is distributive, then choice structure (B, C(▪)) does not necessarily satisfy the weak axiom of revealed preference. (A counterexample suffices.)

5. Exercise 1.C.1 MWG

6. Exercise 1.C.3 MWG