

DECISIONS AND UNCERTAINTY: HOMEWORK # 1

1. In class, I claimed that a cardinal utility is necessary for some decision criteria to make sense. Referring to the hand-out by Luce and Raiffa, look at the minimax risk criterion, the Hurwicz α -pessimism criterion, and the criterion based on the principle of insufficient reason. For each of these criteria, find an example of a decision problem such that, if we take a monotonic increasing transformation of the utility numbers, we change the prescription of the decision rule.
2. Solve exercise 1 of Chapter 1 in Kreps.
3. Solve exercise 2 of Chapter 2 in Kreps.
4. Prove the following statement from class: Suppose that \sim is an equivalence relation (i.e., a symmetric, reflexive and transitive relation) on some set X . Define X/\sim to be the set of the collections of indifferent elements in X . That is,

$$X/\sim \equiv \{A \subseteq X : A = \{y \in X : y \sim x\}, \exists x \in X\}.$$

Show that X/\sim is a *partition* of X . That is, for all $A, B \in X/\sim$, $A \cap B = \emptyset$, and $\cup_{A \in X/\sim} A = X$.

Indeed, a type of converse of the statement is also true. That is, given any reflexive binary relation \sim , the set X/\sim is a partition *only if* \sim is symmetric, and transitive. Prove it.

Would a plain converse be true? That is, is the following statement true: given any binary relation \sim , the set X/\sim is a partition *only if* \sim is reflexive, symmetric, and transitive? Clearly it's not, otherwise I wouldn't ask. Provide a counterexample.