

Decisions and Uncertainty: Midterm Exam

November 3, 2023

Please, answer the following questions. The total number of points is 60. **Time allowed:** 90 minutes. PLEASE PLEASE, make an effort to write in a legible and organized fashion.

1. (30 points) The representation of preferences under certainty.
 - (a) (20 points) Describe the “binary relation” approach to representing such preferences. State the axiom or axioms, discuss it/them briefly, and then state and sketch a proof of a representation theorem. Discuss the difference between dealing with a finite or countable consequence set and an uncountable one, in as much detail as you can.
 - (b) (10 points) What can you say about the uniqueness properties of the utility function? Discuss.
2. (30 points) Consider a decision maker who (wants to satisfy the axioms of expected utility and) has to decide between two portfolios of assets ℓ and ℓ' , with stochastic returns (which we therefore write as functions on a state space $S = \{s_1, s_2, s_3\}$) given by

$$\ell = \begin{cases} 1100, & s_1 \\ 300, & s_2 \\ -500, & s_3 \end{cases} \quad \ell' = \begin{cases} 1275, & s_1 \\ 125, & s_2 \\ -500, & s_3 \end{cases}$$

Suppose moreover that: a) the decision maker is indifferent between a lottery that pays 100 euros if s_1 obtains (and 0 otherwise) and a lottery that pays 100 euros if s_2 obtains (and 0 otherwise); b) the decision maker is *not* indifferent between 100 and 0; c) the decision maker is *strictly* risk-averse (but not necessarily greedy; i.e., her utility function may have decreasing intervals).

What would you advise him to do? Motivate your answer carefully.