1 Problem Set (for October 20)

- Let $X \subseteq \mathbb{R}$ and X be finite with $x \in X$ a prize that amount to € x. Consider the following definition of $f \succcurlyeq_T g$:

$$\min_{s \in T} \sum_{x \in X} x \cdot f(x|s) \geqslant \min_{s \in T} \sum_{x \in X} x \cdot g(x|s) \ .$$

  (a) Give an informal explanation of the relation $f \succcurlyeq_T g$.
  (b) Does this definition of $\succcurlyeq_T$ violate any of the axioms on decision theory? (∗)
  (c) Give an example of a preference (perhaps different from above) such that at least one axiom is violated.

- Consider the following four axioms on preferences of decision makers for lotteries f, g, and h and event S:

  (i) $f \succcurlyeq_S g$ or $g \succcurlyeq_S f$,
  (ii) if $e \succ_S f$ and $g \succcurlyeq_S h$, $\alpha \in (0, 1]$ then $\alpha e + (1 - \alpha)g \succ_S \alpha f + (1 - \alpha)h$,
  (iii) $f \succcurlyeq_S g$ and $g \succcurlyeq_S h$ implies $f \succcurlyeq_S h$, and
  (iv) if $f \succ_S h$ and $0 \leqslant \beta < \alpha \leqslant 1$, then $\alpha f + (1 - \alpha)h \succ_S \beta f + (1 - \beta)h$.

  (Here α, β are reals.) Prove the following two properties.

  (a) The axiom (iii) follows from the first two. (∗)
  (b) The axiom (iv) follows from the first two.