14.123 Microeconomics III—Problem Set 3

Muhamet Yildiz

Instructions. Each question is 33 points. Good Luck!

1. Let P be the set of lotteries over $\{a,b,c\} \times \{L,M,R\}$. In which of the following pairs of games the players' preferences over P are the same?

   (a)

	L	M	R
a	2,-2	1,1	-3,7
b	1,10	0,4	0,4
c	-2,1	1,7	-1,-5

	L	M	R
a	12,-1	5,0	-3,2
b	5,3	3,1	3,1
c	-1,0	5,2	1,-2

   (b)

	L	M	R
a	1,2	7,0	4,-1
b	6,1	2,2	8,4
c	3,-1	9,2	5,0

	L	M	R
a	1,5	7,1	4,-1
b	6,3	2,4	8,8
c	3,-1	9,5	5,1

2. Let P be the set of all lotteries $p = (p_x, p_y, p_z)$ on a set $C = \{x, y, z\}$ of consequences. Below, you are given pairs of indifference sets on P. For each pair, check whether the indifference sets belong to a preference relation that has a Von-Neumann and Morgenstern representation (i.e. expected utility representation). If the answer is Yes, provide a Von-Neumann and Morgenstern utility function; otherwise show which Von-Neumann and Morgenstern axiom is violated. (In the figures below, setting $p_z = 1 - p_x - p_y$, we describe P as a subset of $\mathbb{R}^2$.)

   (a) $I_1 = \{p | p_x = 2p_y + 1\}$ and $I_2 = \{p | p_x = 4p_y + 1\}$
   (b) $I_1 = \{p | p_x = 2p_y + 1\}$ and $I_2 = \{p | p_x = 2p_y\}$
   (c) $I_1 = \{p | p_x \leq 1/2\}$ and $I_2 = \{p | p_x > 1/2\}$
   (d) $I_1 = \left\{p | p_y = (p_x)^2 + 1/2\right\}$ and $I_2 = \left\{p | p_y = (p_x)^2\right\}$

3. On a given set of lotteries, find a discontinuous preference relation $\succeq$ that satisfies the independence axiom.