

**14.123 Microeconomic Theory III**  
**Problem Set 3**

**The due date for this assignment is Thursday March 11**

1. Lecture Notes; Chapter 6.4, Exercise 8.
2. Alice and Bob seek each other. Simultaneously, Alice puts effort  $s_A$  and Bob puts effort  $s_B$  to search. The probability of meeting is  $s_A s_B$ ; the value of the meeting is  $v_A \geq 0$  for Alice and  $v_B \geq 0$  for Bob, and the search costs  $s_A^3$  to Alice and  $s_B^3$  to Bob.
  - (a) Compute the set of all rationalizable strategies.
  - (b) How do the rationalizable search efforts change with  $v_A$  and  $v_B$ ?
3. Consider a game with a finite set  $N = \{1, \dots, n\}$  of players and a finite set  $S = S_1 \times \dots \times S_n$  of strategy profiles. A general information structure is a list  $(\Omega, I_1, \dots, I_n, p_1, \dots, p_n)$  where  $I_i$  is the information partition of  $i$  and  $p_i \in \Delta(\Omega)$  is the prior belief of  $i$  for every  $i \in N$ . For every rationalizable strategy  $s_i^* \in S_i^\infty$  of every player  $i$ , show that there exist a general information structure  $(\Omega, I_1, \dots, I_n, p_1, \dots, p_n)$  and an adapted strategy profile  $(\mathbf{s}_1, \dots, \mathbf{s}_n)$  such that

- $\mathbf{s}_i(\omega^*) = s_i^*$  for some  $\omega^* \in \Omega$  and
- $\mathbf{s}_j(\omega) \in \arg \max_{s_j \in S_j} E_{p_j} [u_j(s_j, \mathbf{s}_{-j}) | I_j(\omega)]$  for every  $\omega \in \Omega$  and  $j \in N$ .

[Hint: For every  $i \in N$  and every  $s_i \in S_i^\infty$ ,  $s_i$  is best reply a belief  $\mu_i^{s_i}$  on  $S_{-i}^\infty$ . Take  $\Omega = S^\infty$ .]

4. Characterize the set of all correlated equilibrium distributions for the following game:

	L	R
U	3, 1	0, 0
D	0, 0	1, 3

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