

Course “Evolutionary game theory and linguistics”

Exam question

1. In Puccini’s opera *Tosca*, Tosca’s lover has been condemned to death. The police chief, Scarpia, offers to fake the execution of Tosca will sleep with him. The bargainer struck. However, in order to keep her honour, Tosca stabs and kills Scarpia. Unfortunately, Scarpia has also reneged on the deal and Tosca’s lover has been executed. Construct a game theoretic representation of this operatic plot.

2. Find the set of rationalizable profiles in the following games.

	<i>L</i>	<i>R</i>
<i>U</i>	3, 0	2, 1
<i>D</i>	2, 1	1, 0

	<i>L</i>	<i>R</i>
<i>U</i>	0, 3	10, 2
<i>C</i>	10, 4	0, 0
<i>D</i>	3, 1	3, 1

3. Find all Nash equilibria of the following asymmetric game:

	<i>L</i>	<i>M</i>	<i>R</i>
<i>U</i>	10, 0	5, 1	4, -2
<i>D</i>	10, 1	5, 0	1, -1

Which of these equilibria are evolutionarily stable?

4. A man has two sons. When he dies, the value of his estate is 1000 Euro. In his will he states that the two sons must each specify a sum of money s_i they are willing to accept. If $s_1 + s_2 \leq 1000$, then each gets the sum he asked for and the remainder (if there is any) goes to the local home for spoilt cats. If $s_1 + s_2 > 1000$, then neither son receives any money, and the entire sum of 1000 Euro goes to the local cats’ home. Assume that (i) the two men care only about the amount of money they will inherit, and (ii) they can only ask for whole Euros. Find all the pure strategy Nash equilibria of this game.

5. Find all ESSs of the following symmetric games:

	<i>A</i>	<i>B</i>
<i>A</i>	1	1
<i>B</i>	1	1

	<i>E</i>	<i>F</i>
<i>E</i>	1	1
<i>F</i>	2	0

	<i>A</i>	<i>B</i>	<i>C</i>
<i>A</i>	0	1	-3
<i>B</i>	-1	0	2
<i>C</i>	3	-2	0