

List of Exercises on Game Theory

Exercise 1 (strategic-form)

Second-price auction.

Exercise 2 (strategic-form)

First-price auction.

Exercise 3 (strategic-form with incomplete information)

Consider a Cournot duopoly where firms have identical costs. Firm i 's cost function, given the quantity produced, is $c_i(q_i) = cq_i$, $i = 1, 2$. Market demand is $P(Q) = a - Q$, where $Q = q_1 + q_2$. Nevertheless, market size is not known by firm 2.

In fact, firm 2 believes that $a = a^H$, with probability p , and $a = a^L$, with probability $1 - p$. All of this is common knowledge.

- i. Formulate this situation as game in strategic form.
- ii. Compute a Bayesian-Nash equilibrium.

Exercise 4 (extensive-form)

Consider the following two-player game. Player 1 chooses *Stop* or *Continue*. If he chooses *Stop*, the game finishes and each player receives 1 Euro. If the player chooses *Continue*, then the two players simultaneously choose non-negative integers and each player receives the product of the chosen numbers in Euros.

- i. Formulate this situation as an extensive form game with imperfect information.
- ii. Determine the set of subgame perfect Nash equilibria.
- iii. How does this set changes is the non-negative integers chosen by both players have to be smaller or equal to $M > 1$?

Exercise 5 (extensive-form)

Consider the following prisoners' dilemma:

	confess	not to confess
confess	2,2	10,0
not to confess	0,10	5,5

- i. If this game is played a finite number of times, will there be cooperation in a subgame perfect equilibrium?
- ii. If this game is played an infinite number of times, will there be cooperation in a subgame perfect equilibrium?

Exercise 6 (extensive-form)

Find the perfect Bayesian equilibria of the following signalling game:

