

Microeconomics for Business

Practice Session 2

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Exercise 1. *In a market there are two firms, firm 1 and firm 2. Each firm produces a good. The two goods are imperfect substitutes. Indeed, the demand function for each good is:*

$$\begin{aligned} Q_1(P_1; P_2) &= 10 - \alpha P_1 + P_2 \\ Q_2(P_1; P_2) &= 10 + P_1 - \alpha P_2 \end{aligned}$$

where P_i is the price of the good produced by firm i . Assume that $\alpha > 1$, and that both firms have a total cost function of $C_i(q_i) = 0, \forall q_i \geq 0$.

The firms maximize their profits and they simultaneously set the prices of the goods. Determine the Nash equilibrium and the level of profits for both firms. How do changes in α affect profits in equilibrium?

Exercise 2. *In the following normal-form game, there are three countries: France, Germany and Italy. Let France choose the rows, Germany choose the columns and Italy choose the matrices. Every country simply chooses her economic policy. Define the strategy space for each player.*

	<i>Development</i>	<i>Austerity</i>
<i>Development</i>	5, 5, 5	3, 6, 3
<i>Austerity</i>	6, 3, 3	4, 4, -1

Development for Italy

	<i>Development</i>	<i>Austerity</i>
<i>Development</i>	3, 3, 6	-1, 4, 4
<i>Austerity</i>	4, -1, 4	0, 0, 0

Austerity for Italy

What strategies survive iterated elimination of strictly dominated strategies? What are the pure-strategy Nash equilibria? Comment on the results.

Exercise 3. Assume there are N firms in the Cournot model we discussed in class. Let q_i be the quantity produced by firm i , and let $Q = q_1 + \dots + q_N$ be the aggregate quantity offered on the market. Let P be the market price for the good and let the inverse demand function be given by $P(Q) = a - Q$ if $Q < a$, 0 otherwise. Assume that the total cost of firm i to produce the quantity q_i is given by $C(q_i) = cq_i$ with $0 < c < a$, that is the marginal cost is constant and identical for all a firms. Following Cournot assume each firm chooses simultaneously her quantity q_i . Characterize the Nash equilibrium of this game. What happens when N tends to infinity?

Exercise 4. Consider the following game with two players, Sonia and Chris are trying to decide on an evening's entertainment. They must choose to attend either the opera or the final match of the regional basketball championship. Both players would rather spend the evening together than apart. However, Chris would rather be together at the Opera, and Sonia would rather be together at the basketball final. Let the payoffs of the players be given by the following matrix, in which the first element represents Chris' payoff, and the second Sonia's payoff.

	Opera	Basketball
Opera	2, 1	0, 0
Basketball	0, 0	1, 2

- Define the strategy space for each player.
- Identify whether there is a strictly dominated strategy for every player.
- Describe the best replies for every player in the game. What can you conclude?
- Characterize all the Nash equilibria, and the corresponding payoffs, in such a game.