TÉCNICO LISBOA

Multiagent decision making and Games in Normal Form - Exercises

Outline

- **Exercises IESDA**
- Exercises NE

Exercise 1

- Predict the outcome with the **iterated elimination of strictly dominated actions:**

		Agent 2		
		Left	***Right***	***Stay***
Agent 1	***Up***	1, 0	1, 2	0, 1
	Down	0, 3	0, 1	1, 2
	Stay	2, 4	2, 1	2, 3

Exercise 2

- **ADVERTISING** Scenario:
  - **Two companies** share a market, in which they currently make $5,000,000 each.
  - Both need to determine whether they should advertise.
  - For each company, advertising costs $2,000,000 and captures $3,000,000 from the competitor provided the competitor doesn't advertise.
  - What should the companies do?

Exercise 2

- How many agents?
- What are the action sets?
- What are the payoffs?
- Predict the outcome with the **iterated elimination of strictly dominated actions**

Outline

- Exercises IESDA
- **Exercises NE**

Exercise 1

- Predict the outcome using the **Nash Equilibrium definition:**

		Agent 2		
		Left	***Right***	***Stay***
Agent 1	***Up***	1, 0	3, 2	0, 1
	Down	0, 3	0, 1	1, 2
	Stay	-1, 4	2, 1	2, 3

Exercise 2

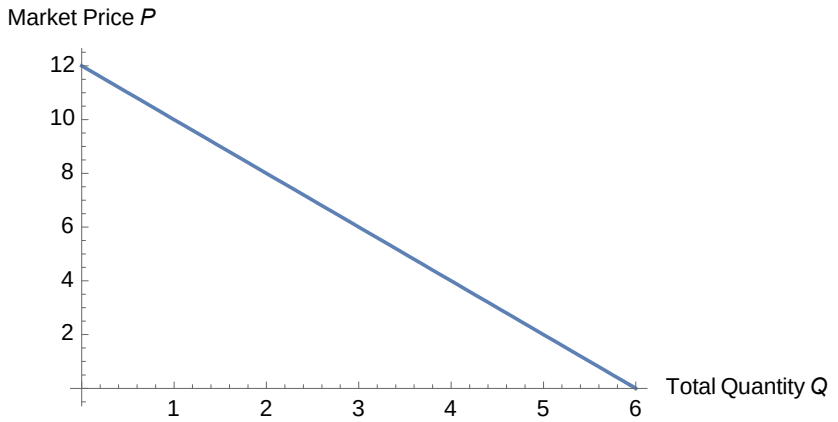
- When a single company controls all of the production of a single good, we call it a **monopoly**
- When exactly two competing firms control the production of an identical good, we call this economic environment a **duopoly**
  - A special case of an **oligopoly**
  - Each firm's production can affect the other's ability to profit

Exercise 2

- Suppose Firm 1 and Firm 2 must spend $1 to produce a unit of a good
- Consumer demand determines the price of the good
  - If the quantity available increases, then the price decreases
  - Let P be the consumer's market price of the good
  - Let Q be the total quantity of units produced by the two firms
    - Where $Q = Q_1 + Q_2$

Exercise 2

- If the firms collectively produce 6 or less units, then price demand function is the following: $P = 12 - 2Q = 12 - 2(Q_1 + Q_2)$



- If the firms collectively produce 6 or more, then $P = 0$

- Hint: each firm has only six plausible production choices: 0, 1, 2, 3, 4, 5 and the profit of firm i is equal to $(P - 1)Q_i$

Exercise 2

- How many agents?
- What are the action sets?
- What are the payoffs?
- Predict the outcome with the **definition of Nash Equilibrium**

Thank You

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