Justus Liebig University Giessen
Faculty 02 - Economics and Business Studies
Chair VWL I

Competition Policy and Strategy
Assignment 2

Exercise 2.1 (**Nash-Equilibrium**)
The two profit-maximizing airlines, A. and D., decide simultaneously on the departure time of their respective flights from London to New York. The price of the flight is fixed in advance, so the only strategic variable they can decide on is their departure time. They can only offer the flight once per day for cost reasons. Depending on the departure time, different numbers of passengers will buy tickets for the flight. In turn, a higher number of passengers results in higher profits, since the marginal costs of an additional passenger on the plane are close to zero. This results in the following payoff matrix:

		A.-Airline	
		morning	evening
D.-Airline	morning	(150, 150)	(300, 500)
	evening	(500, 300)	(400, 400)

Note: For an introduction in game theory see, e.g., Tadelis, S. (2013). Game theory: an introduction. Princeton university press.

a) Specify what is meant by the terms *Players*, *Actions*, *Payoffs* and *Information* in the context of game theory. What are *Players*, *Actions*, *Payoffs* and *Information* in the previously described game?

b) Briefly explain what a Nash Equilibrium is. Find all Nash Equlibria in pure strategies in the game described above.

c) For each of the four games described in the following find all Nash Equilibria in pure strategies. *(Optional: What names are commonly given to each of these games?)*

Game (a)	Player 2		
		L	R
Player 1	U	(1, 1)	(-1, 2)
	D	(2, -1)	(0, 0)

Game (b)	Player 2		
		L	R
Player 1	U	(2, 1)	(0, 0)
	D	(0, 0)	(1, 2)

Game (c)	Player 2		
		L	R
Player 1	U	(1, 0)	(0, 1)
	D	(0, 1)	(1, 0)

Game (d)	Player 2		
		L	R
Player 1	U	(4, 4)	(2, 6)
	D	(6, 2)	(0, 0)

Exercise 2.2 (Cournot Competition)

There are 2 firms in a market that is characterized by Cournot competition. Demand is defined as $Q = 200 - p$. Both firms produce at constant marginal costs of $c = 20$.

a) Describe the difference between the models of Cournot Competition and Perfect Competition as well as a Monopoly.

b) Derive the reaction function for each firm and illustrate them graphically

c) Derive the firms' profits, consumer surplus, and welfare in the market equilibrium.

d) Assume that there are n identical firms in the market. Find the market equilibrium (i.e., quantities, prices, profits, consumer surplus, and welfare) as a function of the number of firms n. Show that the equilibrium price is decreasing in the number of firms and interpret your results.

Exercise 2.3 (Bertrand Competition)

Consider a situation with two firms in a market that is characterized by Bertrand Competition. Demand is defined as $Q(p) = 110 - p$. Both firms produce at constant marginal costs of $c = 10$.

a) Name the differences in assumptions between Bertrand and Cournot Competition.

b) Describe how firms in a Bertrag Competition react to the actions of their competitors.

c) Find and draw the reaction functions of both firms.

d) Find price and quantity in the market equilibrium.