**NTU SSS Economics HE1001**

**Problem Set 4: Game Theory and Oligopoly**

**This problem set will be discussed during the tutorials on 6 - 7 Nov**

**Game Theory**

1. Two major networks are competing for viewer ratings in the 8:00–9:00 pm and 9:00–10:00 pm slots on a given weeknight. Each has two shows to fill these time periods and is juggling its lineup. Each can choose to put its “bigger” show first or to place it second in the 9:00–10:00 pm slot. The combination of decisions leads to the following “ratings points” results:

|  |  | Network 2 | |
| --- | --- | --- | --- |
|  |  | First | Second |
| Network 1 | First | 20, 30 | 18, 18 |
| Second | 15, 15 | 30, 10 |

(b) What will be the equilibrium if Network 1 makes its selection first? If Network 2 goes first?

1. In an ultimatum game, one player, the proposer, is endowed with $10. The proposer is tasked with splitting it with another player, the responder. Once the proposer communicates his decision, the responder may accept it or reject it. If the responder accepts, the money is split per the proposal; if the responder rejects, both players receive nothing. Both players know in advance the consequences of the responder accepting or rejecting the offer. Please predict the outcome.

**Oligopoly**

1. A monopolist can produce at a constant average (and marginal) cost of *AC* = *MC* = $5. It faces a market demand curve given by *Q* = 53 − *P*.

a. Calculate the profit-maximizing price and quantity for this monopolist. Also calculate its profits.

b. Suppose a second firm enters the market. Let *Q*1 be the output of the first firm and *Q*2 be the output of the second. Market demand is now given by

*Q*1 + *Q*2 = 53 − *P*.

Assuming that this second firm has the same costs as the first, write the profits of each firm as functions of *Q*1 and *Q*2.

c. Suppose (as in the Cournot model) that each firm chooses its profit-maximizing level of output on the assumption that its competitor’s output is fixed. Find each firm’s “reaction curve” (that is, the rule that gives its desired output in terms of its competitor’s output).

d. Calculate the Cournot equilibrium (that is, the values of *Q*1 and *Q*2 for which each firm is doing as well as it can given its competitor’s output). What are the resulting market price and profits of each firm?

1. Following Question 1, now we will use the Stackelberg model to analyze what will happen if one of the firms makes its output decision before the other. Suppose Firm 1 is the Stackelberg leader (that is, makes its output decisions before Firm 2). How much will each firm produce, and what will its profit be?