

## Homework 4

### Due November 7, 2017

Homework will be collected at the end of the lecture on the day it is due. Submissions in any other time or manner will be ignored. The maximum score is 100. Unprofessionally looking papers or unnamed or unstapled sheets or improperly labelled questions or bad handwriting will result to a penalty up to 50% at the discretion of the grader. Plagiarism will be prosecuted and perpetrators will be asked to solve a Stackleberg model with  $n > 2$  in order to pass the course.

1. This exercise is designed to make you practice the methodology and draw some intuitive comparisons between the quantity competition models. It's most important part is part (e), which is optional and you need not submit. The market demand is  $p = a - \sum_{i=1}^n q_i$ , where  $q_i$  stands for the  $i$ th firm's output, while  $c_i \geq 0$  is the  $i$ th firm's constant marginal cost. If the model requires a leader, this will be firm 1. By "solve" it is meant: equilibrium quantity, price and profit for every player and total quantity.
  - (a) Solve the Cournot for  $n = 2$ . [20p]
  - (b) Solve the Cournot for  $n = 3$ . [40p]
  - (c) Solve the Collusion for  $n = 2$  and  $n = 3$ . [20p]
  - (d) Solve the Stackelberg for  $n = 2$ . [20p]
  - (e) Look at your results and play around with them. Write a simple computer program or create a spreadsheet, where you set values for the parameters and the code calculates the results automatically. Compare the impact of  $n$  and/or the model, and think about their economic meaning. [0p]