

EconS 424 - Strategy and Game Theory  
Homework #5 - Due date: March 18th, in class.

1. **Harrington, Chapter 13:**

- Exercises 2, 3 and 8.

2. **[Collusion when 2 firms compete in quantities]** Consider two firms competing as Cournot oligopolists in a market with demand

$$p(q_1, q_2) = a - b(q_1 + q_2)$$

where  $a, b > 0$ . Both firms have total costs,  $TC(q_i) = cq_i$  where  $c > 0$  is the marginal cost of production, and  $a > c$ .

- Considering that firms only interact once (playing an unrepeated Cournot game), find the equilibrium output for every firm, the market price, and the equilibrium profits for every firm.
- Now assume that they could form a cartel. Which is the output that every firm should produce in order to maximize the profits of the cartel? Find the market price, and profits of every firm. Are their profits higher when they form a cartel than when they compete as Cournot oligopolists?
- Study under which conditions can the cartel agreement be supported in the infinitely repeated game. For simplicity, let us use the following grim-trigger strategy: first, firms start cooperating (choosing the cartel output), and they continue to do so as long as all firms choose this level of output. If some firm deviates, however, all firms revert to the Cournot output level you found in part (a). Assume that both firms assign the same weight to future payoffs (i.e., they both have the same discount factor  $\delta$ ).