

### Problem Set 5

1. Suppose that there are two firms that face a demand curve  $p(y) = 100 - 2y$ . The marginal cost of each firm is constant one. Suppose that the firms are Cournot competing.

- a. What is the total production?
- b. What if there are three firms in the market?

2. Suppose that there are two firms: a leader and a follower. These firms are Stackelberg competing. The marginal cost of the leader is constant one, and the marginal cost of the follower is constant 2. What is the total production in the market if the demand curve is  $p(y) = 20 - y$ ?

3. Can the leader ever get a lower profit in a Stackelberg equilibrium than he would get in the Cournot equilibrium?

4. (You do not have to hand in the solution to this problem.) Suppose that there are  $n$  identical firms in a Cournot equilibrium. Show that the elasticity of the market demand curve must be greater than  $1/n$ .

5. Suppose that there are two firms operating in a market repeatedly. The demand curve is  $p(y) = 10 - y$  in each period. The marginal cost of each firm is constant one. The interest rate is  $r$  and each firm wishes to maximize the discounted present value of its profits. Suppose that the firms form a cartel behave as if they were a monopoly.

a. Suppose that the firms are Bertrand competing in each period. For what values of  $r$  can they sustain the cartel?

b. Suppose that the firms are Cournot competing in each period. For what values of  $r$  can they sustain the cartel?