

## ECON 321, Assignment 4: BP, Chapter 3: 3.1

1. Read 3.1.1. This “ruinous competition” is not so much a model of what actually happens. It’s more of a thought experiment to make you think “why doesn’t this happen?”
2. Read 3.1.2 quickly. The observation about Amazon Marketplaces at the end is quite interesting.
3. Section 3.1.3 and 3.1.4 use the Hoteling model, which we’ll come back to next class. But read them over for the intuition about differentiated products and about asymmetric competition. Notice that all the demand systems are just versions of  $q_1 = a - bp_1 + dp_2$  with some specific values of the  $a$ ,  $b$ , and  $d$  parameters.
4. Now fire up Mathematica and start with demand system

$$q_1(p_1, p_2) = a - bp_1 + dp_2 \quad q_2(p_1, p_2) = a - bp_2 + dp_1$$

Let marginal cost for both firms be  $c$ .

5. Suppose firms 1 and 2 compete à la Bertrand. Set up each firm’s profit function, then find each firm’s reaction function, and finally find the Nash equilibrium prices, quantities, and profits.
6. Read Section 3.3, especially the intro, 3.3.2, and 3.3.3. In class 3, I solved a Cournot problem where the inverse demand curves were

$$p_1 = 10 - 2q_1 - q_2 \quad p_2 = 10 - 2q_2 - q_1$$

and marginal costs were 1 for both firms. The equilibrium was  $q_1^* = q_2^* = 1.8$ ,  $p_1^* = p_2^* = 4.6$ , and  $\pi_1^* = \pi_2^* = 6.48$ .

What demand curves would be the same as the above inverse demand

curves? What are the results of the Bertrand model when you set  $a$ ,  $b$ , and  $d$  according to these demand curves and set  $c = 1$ ?

7. Some ideas for value-added, which you do not have to do: look at asymmetric firms where either  $a_1 > a_2$  or  $c_1 < c_2$ . In both cases, firm 1 is “better” than firm 2. What does this do to the outcome of the game? What would have to change to achieve the social optimum?