Economics 201 Fall 2020
Introduction to Economic Analysis Jeffrey Parker
Problem Set #6 Due: Wednesday, October 28

1. Cournot Duopoly. Bartels and Jaymes are two individuals who one day discover a stream that flows wine cooler instead of water. Bartels and Jaymes decide to bottle the wine cooler and sell it but, depending on the circumstances, they may either cooperate (collude as a monopolist) or compete as Cournot duopolists. The marginal cost of bottling wine cooler and the fixed cost to bottled wine cooler are both (for simplicity) assumed to be zero. The market demand for bottled wine cooler is given as: $P = 90 - 0.25Q$, where Q is the total quantity of bottled wine cooler produced and P is the market price of bottled wine cooler. Use graphs to illustrate your answers when appropriate. (Remember that you can calculate the marginal-revenue curve corresponding to a linear demand curve easily: it has the same vertical intercept and twice the slope as the demand curve. In other words, if the demand curve is $P = \alpha - \beta Q$, then the marginal-revenue curve is $MR = \alpha - 2\beta Q$. You will need to apply this formula more than once in this problem.)

a. What is the economically efficient price of bottled wine cooler where price equals marginal cost? What is the economically efficient quantity of bottled wine cooler produced?

b. If Bartels and Jaymes were to collude with one another and produce the profit-maximizing monopoly quantity of bottled wine cooler, how much bottled wine cooler will they collectively produce? At that output level, what price will Bartels and Jaymes charge for bottled wine cooler? At that output level, what is the welfare loss relative to the economically efficient point?

c. Now suppose that Bartels and Jaymes act as Cournot duopolists, what are the reaction functions for Bartels and for Jaymes? (Hint: They are symmetric.) In the long run, what level of output will each produce if the two producers act as Cournot duopolists? In the long run, what will be the price of wine coolers be if they act as Cournot duopolists? What will be the welfare loss compared with economic efficiency and with monopoly?

d. If Bartels and Jaymes were to act as Bertrand duopolists, what price would they charge? Would they be better off or worse off than in Cournot equilibrium? Would consumers be better off or worse off?

2. A competitive labor market. The market for production workers in Dudeville, California is highly competitive. The market supply and demand curves for production workers are given as:

$$L_S = -2500 + 1000W \qquad L_D = 10500 - 625W,$$

where L_D = labor demand is full time workers per hour, L_S = labor supply is full time workers per hour, and W = hourly wage. RollerBall Manufacturing Co. employs production workers in the manufacture of bearings for skateboards and roller skates. The firm's production function is given by the expression:

$$Q = 88.8L - 0.5L^2,$$

where Q = output, measured as boxes of bearings per hour, and L = number of workers employed per hour. From this production function, the marginal product and average product of labor are:

$$\text{MP} = 88.8 - L \qquad \text{AP} = 88.8 - 0.5L$$

RollerBall currently sells bearings for $10 per box and is a price-taker in both output and input markets.

a. Determine the equilibrium wage and level of employment in the market. Calculate the total rent that is being earned by workers.
b. Determine the number of workers that RollerBall Manufacturing would employ at the wage determined in part (a). What total output will RollerBall produce?

3. A Location Game. Suppose that two vendors, Häagen and Dazs, are selling ice cream on a crowded beach. There are five possible sites (North, North-Central, Central, South-Central, and South) on the beach at which either or both could locate (and the sites are large enough for multiple vendors). Costs are equal at all sites. The five locations are each 100 yards apart along the beach, with the total of 1,000 potential customers divided equally among the five sites (200 at each location). Each customer buys one ice cream from the nearest vendor (or flips a coin if the two vendors are equi-distant) and the vendor makes $1.00 of (accounting) profit for each sale and can serve as many customers as it can attract with constant marginal cost.

a. There are 25 possible combinations of locations for Häagen and Dazs, as reflected in the 5-by-5 matrix below. Fill in the payoffs for each seller for each combination. (There is a Word file containing the table linked from the Assignment page of the Web site. You can download this and use it for your answer if you want.)

		Dazs				
		North	North-Central	Central	South-Central	South
Häagen	North	H: D:	H: D:	H: D:	H: D:	H: D:
	North-Central	H: D:	H: D:	H: D:	H: D:	H: D:
	Central	H: D:	H: D:	H: D:	H: D:	H: D:
	South-Central	H: D:	H: D:	H: D:	H: D:	H: D:
	South	H: D:	H: D:	H: D:	H: D:	H: D:

b. What is the Nash equilibrium for this game? Where will they end up locating? Why would it not benefit either seller to move?

c. What is the distance of the average consumer from the nearest vendor in the Nash equilibrium? Is there a way to relocate the vendors that would improve the welfare of the average consumer by reducing this distance? If you were a benevolent dictator seeking to maximize consumer benefit, where would you put them? Why? Would the two sellers be better or worse off under your dictatorial location directive?