Boğaziçi University
Department of Economics
Fall 2016
EC 301 ECONOMICS of INDUSTRIAL ORGANIZATION
Problem Set 5

1. Consider a 1 km linear city with N many consumers uniformly distributed along the city. There are only two supermarkets, A and B, serving this city. A is located right in the middle of the city. B is located outside of the city. The supermarkets sell the same fixed basket of goods. A has zero marginal cost and B has a marginal cost of 1TL per basket. They pick their prices simultaneously, p_A and p_B. Each consumer needs only one basket of goods. Each consumer, after observing the price of each supermarket, chooses which supermarket to buy from. Consumers who choose to buy from A has to travel to the supermarket then travel back home, incurring a transportation cost of 3TL per unit distance on the way to the supermarket with no basket, and 4TL per unit distance on the way back home with the basket of goods. Consumers who choose to buy from B, do not incur any transportation cost, because supermarket B delivers the basket for free. Find the equilibrium prices.

2. Suppose that there are 3000 buyers distributed over a 1 km beach such that 1000 buyers are distributed evenly over the west half of the beach, and 2000 buyers are distributed evenly over the east half of the beach. Each buyer incurs a transportation cost t per km. Each buyer buys only one ice-cream. There are two ice cream sellers, A and B. A is located at the west end of the beach, and B is located at the east end. Seller A has a marginal cost given by $MC_A = 1$ TL and seller B has a marginal cost given by $MC_B = 2$ TL. There are no fixed costs. Sellers are simultaneously setting their prices, P_A and P_B.

   (a) Find the location, $\widehat{x}$, of the buyer who is indifferent between buying from seller A and buying from seller B, as a function of P_A, P_B, and t.

   (b) Suppose that the prices are such that $\widehat{x}$ is in the west half of the beach. Write the profit of each seller as a function of P_A, P_B, and t.

3. Consider a 1 km linear city that stretches along a hill. Consumers are uniformly distributed along the city. There are two supermarkets, A and B, in this city. A is located 0.3 km away from the bottom of the hill, and B is located 0.1 km away from the top of the hill. The supermarkets sell the same fixed basket of goods with zero marginal cost. They pick their prices simultaneously, p_A and p_B. Each consumer needs only one basket of goods. Each consumer, after observing the price of each supermarket, chooses which supermarket to buy from. Going downhill with a basket of goods costs 2TL per unit distance traveled and with no basket it is costless. Going uphill with a basket of goods costs 5TL per unit distance traveled and with no basket it costs 3TL per unit distance traveled. Note that each consumer has to travel to the supermarket then travel back home. Find the equilibrium prices.

4. Consider the location model we discussed, where the two firms first pick their location simultaneously and then compete in prices. Show that minimal differentiation (locating at the same point, that is, $a + b = 1$) is not an equilibrium, by showing that there is a deviation.

5. Consider the circular city model we discussed in class. Recall that the market is circular and there is free entry. Suppose that the transportation cost to travel a distance x is $TC(x) = 0.5x^2$. All firms have a marginal cost equal to $c = 2$TL and a fixed entry cost $f = 100$TL.

   (a) Find the equilibrium price for a given the number of firms, n.

   (b) Find the equilibrium number of firms.

   (c) Find the socially optimal number of firms. Compare it to the one you found in (b) and comment.

6. Nispetiye avenue is best described as the interval $[0, 1]$. Two kebab places serving identical *iskender* are located at the edges of the avenue. Antep Iskender (A) is located at the southwest end of the avenue, and Bursa Iskender (B) is located at the northeast end of the avenue. Both A and B have a marginal cost equal to $c > 0$. Iskender consumers are uniformly distributed on the avenue (on the interval $[0, 1]$), where at each point on the interval lives one consumer. Each consumer buys one iskender from the restaurant in which the price plus the transportation cost is the lowest. On Nispetiye Avenue, however, there is a constant wind (Lodos) blowing from the northeast end toward the southwest end, hence the transportation cost for consumer who travels to the northeast is w TL per unit of distance, and only 1TL for a consumer who travels to the southwest, where $w > 1$. Transportation costs are linear. Let p_i denote the price of an iskender at restaurant i, where $i = A, B$. Let $\widehat{x}$ (the distance to A) be the location of the consumer who is indifferent to whether he/she eats at Antep Iskender or Bursa Iskender.

   (a) Find $\widehat{x}$ as a function of p_A, p_B and w.

   (b) How does $\widehat{x}$ change with respect to w? Provide some intuition.

   (c) Find the equilibrium prices, p_A^* and p_B^*, as a function of w and c.

   (d) Suppose $w = 2$ and $c = 1$. Find $\widehat{x}$. Is it closer to A or B? Why?