Topic 5: Mergers and vertical relations

1. Consider a three-firms market. The inverse demand function is given by $p = 24-Q$. Fixed and variable costs are equal to zero. Suppose that each firm has a maximum production capacity of 6 units.
    a. Determine the Cournot equilibrium
    b. Suppose a merger between firms 2 and 3 . Determine the new equilibrium.
    c. Show that the merge increases the profits of the firms participating in the merger.

2. Consider a Cournot triopoly with inverse demand function $p=500-Q$ and constant marginal costs $c_1=100$ and $c_2=c_3=200$.
    a. Determine the market shares of each firm and the Herfindahl index.
    b. Suppose that (i) firms 1 and merger and (ii) firms 2 and 3 merger. Calculate the new equilibrium situation in each one of the cases.
    c. Compare the value of the Herfindahl index in part a) with the value of the Herfindahl index in part b). Comment the results.

3. Consider two successive monopolists in production chain: firm I produces and intermediate good that is used by firm F to produce the final good. Suppose that firm I marginal costs is constant and equal to c and firm F marginal cost is equal to the price set by firm I (that we call w). The demand function of the final good is given by $q(p)= 1-p$, where p is the price set by firm F.
    a. Calculate equilibrium price and quantity without vertical integration.
    b. Calculate equilibrium price and quantity with vertical integration (firm I forward integrates firm F)
    c. Define the double marginalization phenomenon. Does vertical integration solve this phenomenon?
    d. Use figures to analyse the incentives of firm I for vertical integration.
    e. Calculate the effects of vertical integration in social welfare and use figures to show them.

4. Suppose two successive monopolists in a production- distribution chain. Suppose that the marginal cost of producer I is constant and equal to $c=2$ and that of the retailer F is the price set by producer I (that we will call w). The retailer F demand function is $q(p)=20-p$, where p is the price set by the retailer.
    a. Calculate equilibrium price and quantity without vertical integration.
    b. Calculate equilibrium price and quantity with vertical integration (firm I forward integrates firm F)
    c. Define the double marginalization phenomenon. Does vertical integration solve this phenomenon?
    d. Use figures to analyse the incentives of firm I for vertical integration.
    e. Calculate the effects of vertical integration in social welfare and use figures to show them.

Topic 6: Product differentiation (I): patterns of price setting

1. A population of potential consumers is uniformly distributed with density 1 along a segment of 2000 meters. Two firms compete to sell a product that is homogeneous except for the location of the firm. Firm 1 is located at a distance of 400 meters from the left end of the segment and firm 2 at a distance of 400 metres from the right end of the segment. The utility that a consumer j obtains buying the product at firm i is given by $U_{ji}=r-p_i-tx_{ij}$, where p_i is the price set by firm i, x_{ij} is the distance along the segment between the location of consumer j and the location of firm i, and t is the transport cost per meter.
    a. Obtain the demand for each one of the firms
    b. Calculate the own-price elasticity of demand of firm 1. How does this elasticity change when the transport cost changes?
    c. Suppose that the unit cost of production is identical for both firms and equal to 10. Obtain the reaction functions for firms 1 and 2.
    d. Obtain the Nash equilibrium in prices.

2. A population of potential consumers is uniformly distributed with density 1 along a segment of 1500 meters. Two firms compete to sell a product that is homogeneous except for the location of the firm. Firm 1 is located at a distance of 100 meters from the left end of the segment and firm 2 at a distance of 400 metres from the right end of the segment. The utility that a consumer j obtains buying the product at firm i is given by $U_{ji}=r-p_i-tx_{ij}$, where p_i is the price set by firm i, x_{ij} is the distance along the segment between the location of consumer j and the location of firm i, and t is the transport cost per meter.
    a. Obtain the demand for each one of the firms
    b. Calculate the own-price elasticity of demand of firm 1. How does this elasticity change when the transport cost changes?
    c. Suppose that the unit cost of production is identical for both firms and equal to 20. Obtain the reaction functions for firms 1 and 2.
    d. Obtain the Nash equilibrium in prices.

3. Recall Hotelling's product differentiation model. A population of potential consumers is uniformly distributed with density 1 along a segment of 1000 meters. Each consumer buys only one unit of a product that is identical except for the location of the firm. Firm 1 is located at a distance of 250 meters from the left end of the segment; firm 2 is located at a distance of 250 meters from the other end of the segment.
    a. Obtain the demand for each firm.
    b. Determine the Nash equilibrium in prices.

Topic 7. Product differentiation (II): market structure

1. Recall Salop's model. A population of L consumers is uniformly distributed with unit density around a lake, being the circumference of the lake 2000 meters. Each consumer buys a unit of a product that is homogeneous except in the location of the firm. In order to enter the market a firm has to incur an entry cost of F=500. . The utility that a consumer j obtains buying the product at firm i is given by $U_{ji}=r-p_i-tx_{ij}$, where p_i is the price set by firm i, x_{ij} is the distance along the circumference between the location of consumer j and the location of firm i, and t=20 is the transport cost per meter. Firms locate equidistant from each other around the lake circumference.
    a. Calculate the demand for each firm.
    b. Obtain the Nash equilibrium in prices
    c. Determine the number of firms that enter the market.

2. Recall Salop's model. A population of L consumers is uniformly distributed with unit density around a lake, being the circumference of the lake 10000 meters. Each consumer buys a unit of a product that is homogeneous except in the location of the firm. In order to enter the market a firm has to incur an entry cost of F=2500. . The utility that a consumer j obtains buying the product at firm i is given by $U_{ji}=r-p_i-tx_{ij}$, where p_i is the price set by firm i, x_{ij} is the distance along the circumference between the location of consumer j and the location of firm i, and t=100 is the transport cost per meter. Firms locate equidistant from each other around the lake circumference.
    a. Calculate the demand for each firm.
    b. Suppose that the unit cost of production is identical for all the firms, c=20. Calculate the reaction function of the representative firm and obtain the Nash equilibrium in prices
    c. Determine the number of firms that enter the market.