# Practice Set 3
Market Power

**Microeconomics 2**
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m2

This problem set contains material for the relevant lab. Lab teachers are expected to provide sufficient guidance for the entire problem set. It is in the teacher's discretion to select the most representative tasks to solve instructionally in every lab. For the rest of the tasks, methodology, hints and final answers will be provided. Students are expected to work on practice problems, however, they are not required to submit written solutions. It is a non-negotiable policy in this course to not provide handouts with the solutions of practice problem sets.

1. Consider a market where there is only one seller. The cost of production is $C(q) = F + v \cdot q^2$. The demand function in this market is $p = A - b \cdot q$.

   (a) Derive the equilibrium price and quantity as a function of $F, v, A, b$.
   (b) Calculate the profit of the monopolist.
   (c) Calculate the consumer surplus and the producer surplus for this market.
   (d) Calculate the DWL for this market.

2. A monopolist produces output in locations 1 and 2. The cost in location 1 is given by $C_1(q_1) = q_1^2$ and in location 2 by $C_2(q_2) = 0.5 \cdot q_2^2 + 5q_2$. Demand in this market is given by $p = 120 - 0.5q$, where $p$ is the price and $q$ is the total quantity produced by the monopolist.

   (a) Calculate the equilibrium quantities for each location and the price.
   (b) Calculate the equilibrium profit for the monopolist.
   (c) Draw the graph for this market and demonstrate how to find the equilibrium graphically.
   (d) Derive a single marginal cost function for the monopolist assuming that for each output level he will distribute production between locations in the most efficient way.

3. Consider a monopolist who faces a demand curve $p = a - bq$. Average cost is constant and equal to $c$.

   (a) Derive the profit function for this monopolist.
   (b) Maximize the profit function with respect to quantity to derive the first order condition.
   (c) Find the profit maximizing quantity, price and profit as a function of $a, b$ and $c$.
   (d) Find the DWL as a function of $a, b$ and $c$.

4. Consider a monopolist who faces a demand curve $q = a - p$. Average cost is constant and equal to $c$. The government decides to impose a sales tax, $t$ rubles on each unit of the product sold.

   (a) Provide a neat graph showing the effect of the tax on the price of the product.
   (b) Calculate algebraically the effect of the tax as a function of $a$ and $c$.

5. Consider a market where the demand is given by $p = 10 - q$ and the supply is given by $p = 2 + q$. Assuming a PC environment, find the level of FC for which the profit of the firm will become zero.

6. A monopolist has production function $Q = 2L + K$. A unit of labor costs $w = 10$ are and a unit of capital costs $r = 6$. The monopolist faces demand

$$p(Q) = \frac{10}{\sqrt{Q}}.$$

   Calculate the value of deadweight loss.

7. Assume that the market demand for a product is $Q = A - bP$ and that there is only one firm with total cost function $C(q) = \gamma Q$.

   (a) Derive the monopoly price and output.

(b) Derive the monopoly's profit.

(c) Derive is the PC output and the DWL for the monopoly market.

(d) Derive the CS for the monopoly market.

(e) Rank the monopoly's profit, the CS and the DWL.

(f) Find how profit, CS, and DWL are affected by $b$.

(g) Find how profit, CS, and DWL are affected by $\gamma$.

8. Assume that there are two periods indexed by 1 and 2. The market demand in each period is $Q_i = 200 - P_i$ where $i = 1,2$ indexes the period. The monopolist's MC is constant at 50 in the first period. In the second period it becomes $MC_2 = 50 - 0.2Q_1$, i.e. it is negatively related to the production of the previous period. Assume that there is no discounting between periods.

(a) What is the profit maximizing output of the monopolist in the first period if the monopolist does not care for its future profit?

(b) What is the output in the second period given that in the first period the monopolist did not care for its future profit?

(c) What is the total profit in the two periods given that in the first period the monopolist did not care for its future profit?

(d) Now assume that in the first period the monopolist maximizes total profit from both periods. What would be the output and the profit in each period?

(e) Does it make any difference in the total profit if the monopolist cares about future profit? Explain why.