

# Homework 17

## Due March 13, 2018

Homework must be on the front desk at K9 by 15:10. Papers turned in from 15:11 till 15:40 will be accepted at a penalty of 5 points. Submissions at any other time or manner will be ignored. Any paper which does not look as if it came from a student of a world-class institution (not clean, illegible, unnamed, unstapled, unlabelled tasks, final results not in boxes etc.) will be penalized with up to 50 points at the discretion of the grader. Cheating in homework is a serious offense and it will be prosecuted with consequences beyond the credit of this assignment.

1. A monopoly has total cost  $TC = F + cQ$  and faces market demand of  $Q = a - bP$ . Derive the monopolist's output, profit and the consumer surplus if:
  - (a) Price is set to marginal cost. [15p]
  - (b) Price is set to average cost. [15p]
  - (c) There is two-part tariff pricing and the firm chooses the tariff to maximize profit. Assume that there are  $N$  identical consumers. [15p]
  - (d) There is a two-part tariff which a regulator chooses to maximize consumer surplus, subject to the monopolist breaking even. Assume that there are  $N$  identical consumers. [20p]
  
2. A monopoly produces two products with demand functions  $Q_i = k_i p_i^{-\varepsilon_i}$  for  $i = 1, 2$ , where  $\varepsilon_i$  is the absolute value of the constant elasticity of demand and  $k_i$  is a parameter that reflects the size of the market. The cost function is  $C(q_1, q_2) = f + \sum_{i=1,2}(f_i + q_i)$ , where  $f$  is a fixed common cost and  $f_i$  is product-specific cost.
  - (a) Explain the factor or factors that may contribute to this market becoming a natural monopoly. [15p]
  - (b) Suppose that  $\varepsilon_1 = 6$ ,  $\varepsilon_2 = 1.1$  and  $k_1 = k_2 = 20$ ,  $f = 2$ ,  $f_1 = f_2 = 0.5$ . Using the optimal condition for Ramsey pricing find the prices and quantities for each good and the total surplus for both markets. You may use software for the calculations. [20p]