Exam 2021-10-28, 13:00–16:00. Individual open book exam.

I (10p) Rääsy MegaStore is the largest retailer of apparel in the city of Tuppukylä, where it has rented a building from the city. The city had taken over a former manufacturing site from a company that went bankrupt, and originally rented out the building at a low rent to attract retailers to the city. Now the contract is up for renewal and the city is considering a large hike in the rent. Rääsy executives argue that a rent hike will just force it to pass on the cost its customers. Any additional rental revenue the city would make would at best just be an illusory gain for the citizens of Tuppukylä, as they would just have to pay it back in higher apparel prices. Briefly evaluate the argument made by Rääsy executives.   (2–3 sentences)

II (10p) Extreme volatility in the prices of root vegetables has disturbed consumers in Farfar islands in recent years. It is known that professional speculators have entered the root vegetable market, some storing large amounts of root vegetables across seasons. (Stored and newly picked root vegetables are indistinguishable, as far as Farfarian consumers are concerned.) Some analysts have suggested that speculators have caused the volatility of root vegetable prices to increase. Explain why and how whether these analysts are correct depends on whether the speculators have made profits or losses.   (2–3 sentences)

III (10p) Acme is currently selling items to both students and workers at a uniform price. Sales to both groups are roughly equal. There are reasons to believe that workers' demand for items is more elastic. There is a credible student ID system. How should Acme differentiate prices?   (2–3 sentences)

IV (16p) Depict the welfare effects of the following with a graph in demand-and-supply framework. A schematically correct graphs suffices, i.e., no need for numerical coordinates. Neither demand nor supply should exhibit extreme (zero or infinity) elasticity.

(a) A monopoly that used to charge the profit-maximizing price shifts to average-cost pricing. It faces decreasing returns to scale. Highlight the area that represents the resulting change in deadweight loss.

(b) A price floor is instituted, and the worst case scenario for total surplus is realized. Highlight areas representing producer and consumer surpluses under the price floor.

For the remaining questions you need to show the arguments and steps behind your reasoning, backed up by calculations where relevant.

V (27p) Households in the capital city of Lintukoto use wooden pellets to heat their houses. The demand for pellets is $Q^d(p) = 1200 - 25p$ tons per day, where p is in €/kg. There are 1000 forest estates around the rural regions of Lintukoto that could each produce up to 1 ton/day at a constant marginal cost of 5 €/kg. The cost of transporting pellets to the market is increasing in the distance from the capital. Consequently the transport cost varies between estates and is uniformly distributed between 5 and 45 (€/kg).

   (a) What is the equilibrium price? How many estates produce pellets in equilibrium?

   (b) Continued from part Va. Increased price of fuel causes all transportation costs to double. How many estates stop producing pellets in response?

   (c) Households in the capital city form a cooperative to merge their pellet purchases into one daily purchase. The cooperative aims to maximize consumer surplus. What is the resulting price of pellets? What impact does the cooperative have on welfare (compared to part Va)?

VI (27p) Bonk Inc has invented a clean energy source derived from anchovy oil. Deploying the invention would require building a dedicated facility at a cost of €100 million. Construction would last for one year, after which Bonk could produce up to 500,000 BOE (barrel-of-oil equivalents) of energy per year at a constant marginal cost of 20 €/BOE. Due to finite anchovy resources, Bonk would remain a small player in the world energy market and have negligible impact on the market price. Bonk's discount rate is 2%.

Disconcertingly for Bonk, there is a chance that the introduction of bionic duckweed will make anchovy oil obsolete by enabling unlimited amounts of energy to be produced at a price below 20 €/BOE. (Bonk observes aggregate supply before making its decision for the period.) Until then the price of energy is expected to fluctuate wildly, but always to stay above 20 €/BOE and with an average value of 40 €/BOE.

   (a) Suppose Bonk knows that bionic duckweed will be introduced 11 years from now (i.e., in $t = 11$). What is the present value of investing in the anchovy oil facility?

   (b) Every year the probability that bionic duckweed is introduced is 6%. What is the present value of investing in the anchovy oil facility?

   (c) Bionic duckweed is going to be invented in five years. At the time of invention it will become known how difficult it is to actually introduce duckweed as a commercially viable product to the energy market. This difficulty is described by a parameter x: starting from $t = 6$ the yearly probability of commercial introduction will be x, which is now seen as equally likely to be any of $x \in \{0, 0.5, 1\}$. What should Bonk do?