Intermediate Microeconomics

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Midterm Exam 2

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Attempt as many questions as you have time for. Put your name and banner ID on each book you use. Don't panic! Good luck.

Question 1 - 15 points Say that Donovan's Brewery produces lager (l), which is sold for 1 per unit. Its only input is hops (h), which cost p_h per unit. If it uses less that 10 hops, its output is given by $l = 2h$. If it uses more than 10 hops, its output is given by $l = 10 + h$. Sketch the production function for Donovan's Brewery. What has to be true about p_h for Donovan's to choose to produce neither 0 nor ∞? How much will they choose to produce in such a case? Draw the supply curve for Donovan's brewery.

Question 2 - 25 points This is a partial equilibrium question for the market for apples. Say that demand is given by $D(p) = 20 - bp$, and supply is given by $S(p) = 3p$

1. Graph the supply and demand curves. Show that the producer surplus for selling a apples is $\frac{a^2}{4}$ and the consumer surplus for selling a apples is $\frac{1}{2b}a^2$

2. Now calculate the equilibrium price and output. What is consumer and producer surplus at equilibrium? (note that these will all be a function of b)

3. Imagine that the government imposes a tax t, so that if a supplier sells an apple for price p, a consumer has to pay $p(1 + t)$. Calculate the new equilibrium price, consumer surplus, producer surplus and deadweight loss.

4. Does the tax have a bigger effect on prices if b is high or low? What about output? Consumer surplus? Producer surplus? Can you explain why this is?

Question 3 - 25 points The Fishcoteque produces halibut (h) using nets (n) and boats (b). Their production function is given by $h = n^{\frac{1}{2}}b^{\frac{1}{2}}$.The price of halibut is 4, the price of nets is 2 and the price of boats is 3

1. Calculate the cost function for the Fishcoteque.

2. Graph the marginal revenue, marginal cost and average cost functions

3. Calculate the profit maximizing level of halibut for the Fishcoteque. What profit will they make at this level of output?

4. Harry the Hardcase decides to extort money out of the Fishcoteque. He will charges an amount F regardless of how much halibut they sell. Re-graph the marginal revenue, marginal cost and average cost, but now add an average variable cost curve. What is the profit maximizing level of output for the Fishcoteque now? Will they always produce a positive amount of halibut?

5. The owners of the Fishcoteque think of another option: They could run away to Siberia. This will cost them an amount of money S, and they would not be able to sell any more halibut, but they would not have to pay Harry. What is the maximum amount that Harry can extort (as a function of S) to stop the owners running away?

Question 4 - 35 points Robinson Crusoe, having spent too much time on the island, has now split himself into three: RC the person, RCI the company and RC.gov, the government. RC the person buys starfruit (s) and sells labor (l), and has preferences over starfruit and leisure given by $u(s, 24 - l) = s^{\frac{1}{2}}(24 - l)^{\frac{1}{2}}$. RCI the company buys labor from RC and sells starfruit. It has a production function $s = l^{\frac{1}{2}}$. RCI the government adds a tax of t to each starfruit sold. Thus, if RCI sells a starfruit for p, RC has to pay $(1 + t)p$

1. Sketch the production function of RCI and the indifference curves of RC on the same graph. Imagine that you are the social planner, and are going to pick a feasible combination of starfruit and labor to maximize the utility of RC. Show that you would pick the point where the marginal product of labor is equal to the marginal rate of substitution. Find the optimal bundle of starfruit and labor

2. Say that the wage rate is fixed at 1, and the pre-tax price of starfruit is given by p (i.e. RCI receives p for each starfruit sold). Calculate the profit maximizing amount of labor

for RCI as a function of p, and the profits that RCI make at this level of output (also as a function of p)

3. RC gets money from selling his labor, and is also the sole owner of RCI (and so gets all the profits). The price he has to pay for starfruit is $(1 + t)p$. However, he also gets a rebate from the government equal to R Write down RC's budget constraint and draw it on a graph. Using the fact that the slope of the budget line must equal the marginal rate of substitution between starfruit and leisure, calculate RCs supply of labor and demand for starfruit as a function of p and R

4. Show that, if $t = 0$ and $R = 0$ then the competitive outcome is optimal (i.e. the point at which labor demand equals labor supply is the point that maximizes RC's utility). However, if $t > 0$ then the marginal product of labor will not equal the marginal rate of substitution in any equilibrium.

5. Say that the revenue that the government gives to RC is equal to the total tax revenue the government gets (i.e. ts). Plug this into your answer for 3. Find the price p at which the demand for labor is equal to the supply of labor. What happens to labor supply as t increases.