Intermediate Microeconomics

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Final Exam

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You have 3 hours to complete the exam, which should be plenty. Good Luck and DON'T PANIC

Question 1 - 10 points Consider the following procedures for choosing bottles of wine. Do they satisfy the independence of irrelevant alternatives? If they do, prove this is the case. If not, give a counterexample to show why it fail (assume all wines have different prices)

1. (3 pts) The consumer always chooses the cheapest wine from the list
2. (3 pts) The consumer always choose the second most expensive wine
3. (4 pts) The consumer chooses the cheapest bottle of red from the list, unless that is more than \$20 in which case they choose the cheapest bottle of white

Question 2 - 25 points Tina consumes guns (g) and butter (b). Guns cost p_g and butter cost p_b. Tina's income is M. Her utility is given by $u(g,b) = 2\ln g + \ln b$

1. (2 pts) What is Tina's marginal rate of substitution between guns and butter?
2. (3 pts) Find Tina's optimal consumption as a function of prices and income
3. (3 pts) For guns, calculate Tina's income elasticity, price elasticity and cross elasticity of demand.
4. (2 pts) What happens to Tina's demand for butter if both prices and income doubles
5. (3 pts) Now imagine that Tina is trapped on an island, with an allocation of 7 guns and 3 lumps of butter. Imagine also that the price of guns is now 1. The only income that

Tina now gets is from selling her allocation of guns and butter. Calculate Tina's demand for butter as a function of p_b (hint, you can use your answer from part 2 to make this quicker)

6. (3 pts) Also on the island is Enrico. He has exactly the same preferences as Tina, but has 8 lumps of butter and 2 guns. Draw an Edgeworth box for this economy, and sketch both Tina and Enrico's indifference curves at their allocation
7. (2 pts) Write down Enrico's demand for butter as a function of p_b (hint: you again should be able to use your answer to 2 to make this quicker)
8. (3 pts) What is the equilibrium price in this economy? What are the equilibrium allocations?
9. (4 pts) Calculate the utility that Tina gets in equilibrium. Show that the equilibrium allocation maximizes Enrico's utility subject to Tina having this level of utility

Question 3 - 15 points Albion makes quicksilver. It is a monopoly. If it produces q_A then it can sell its output for $p(q_A) = 4 - 4q_A$. It's cost is given by $c(q_A) = 2q_A$

1. (5 pts) Sketch the demand curve for quicksilver, and Albion's marginal revenue and marginal cost. What is Acme's profit maximizing output. What price will they charge? What profits will they make? (Assume that Albion cannot charge two part tariffs - they just set output, and charge the price per unit indicated by the demand curve)
2. (8 pts) Now Benelux enters the market as a competitor. The cost of Benelux producing q_B is q_B, and if Albion produce q_A and Benelux produce q_B, the price in the market is $4-4(q_A+q_B)$ - in other words, the demand curve is the same, but now price is determined by the total output of the two firms. If Benelux produces q_B^*, what is Albion's profit maximizing output? If Benelux produce q_A^* what is Albion's profit maximizing output? What is the Nash Equilibrium of output? What profits do each firm make at each level of output
3. (2 pts) For parts (1) and (2) calculate consumer surplus. Is **total** surplus higher when there is one or two firms?

Question 4 - 15 points Stan has an expected utility function for money is given by $u(x) = x^{\frac{1}{2}}$

1. (3 pts) What utility would Stan get if he received \$100 for sure? What about if he had a lottery ticket that gave him \$50 with a probability 0.5 and \$150 with probability 0.5? Is Stan risk averse or risk loving?
2. (6 pts) Stan's wealth is \$100,000. However, he lives in Alaska, and there is a $\frac{1}{6}$ probability that his house will be destroyed by a Moose that has gone rogue, which will cost his \$50,000. Alternatively, he can buy insurance for an amount F, which will pay him \$50,000 in the case of a moose destroying his house. What is the maximum amount that Stan would pay for insurance. Would the insurance company make positive or negative expected profit if it sold insurance for this price.
3. (6 pts) Having moved to California, Stan now does not suffer from the risk of moose attacks, but can now buy a Arnie's lottery tickets. The lottery ticket gives a 1 in a million chance of winning \$1 million dollars. How much would Stan pay for such a lottery ticket? At this price, would the lottery company have positive or negative expected profits? (To make things simpler, assume that if Stan wins, he also gets the price of the lottery ticket refunded)

Question 5 - 10 points The demand in Australia for hats with corks on them is given by $D(p) = 30 - 6p$. while supply is given by $S(p) = 4p$

1. (3 pts) If Australian consumers consume q hats, what is their consumer surplus? If Australian producers sell q hats, what is their producer surplus? What is the equilibrium price, quantity and consumer and producer surplus?
2. (4 pts) Australia discovers the rest of the world, and gain access to the global market. On the global market, Australians can buy or sell as many hats at \$2 as they want. Calculate the new equilibrium. How many hats will Australians consume? How many will they produce? Will they import or export hats? What is the new level of consumer or producer surplus? Has total surplus increased with access to the global market? Is this a Pareto improvement for consumers and producers?
3. (3 pts) The Australian government now imposes a tariff of \$1 per imported hat. Calculate the new equilibrium outcome. What is consumer surplus, producer surplus and total surplus?

Question 6 - 25 points As you know by now, Robinson is on an island, and is still pretending to

be a person (RC) and a firm (RCI). RC the person buys dragnonfruit (d) and sells labor (l), and has preferences over dragonfruit and leisure given by $u(d, 24-l) = d^{\frac{2}{3}}(24-l)^{\frac{1}{3}}$. RC the company buys labor from RC and sells dragonfruit. It has a production function $d = l^{\frac{1}{2}}t^{\frac{1}{2}}$, where t is the number of dragonfruit trees on the island

1. (5 pts) Assume that $t = 2$ for the first 4 parts of the question. 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 dragonfruit and labor to maximize the utility of RC. Find the optimal bundle
2. (5 pts) Say that the wage rate is fixed at 1, and the price of dragonfruit is given by p. Calculate the profit maximizing level of dragonfruit output as a function of p, and the profits at this level of output.
3. (5 pts) RC gets money from selling his labor, and is also the sole owner of RCI. Write down RC's budget constraint. Calculate his supply of labor and demand for dragonfruit as a function of p
4. (5 pts) Find the equilibrium level of dragonfruit output, and the equilibrium price.
5. (5 pts) Say that there is a sudden growth spurt of dragonfruit trees on the island, and there are now 3 trees. Recalculate the equilibrium of the economy.