Economics Honors Exam Review (Micro) **Mar. 2017**

Based on Zhaoning Wang's final review packet for Ec 1010a, Fall 2013

1. The inverse demand function for apples is defined by the equation $p = 214 - 5q$, where q is the number of units sold. The inverse supply function is defined by $p = 7 + 4q$.

(a) How many apples will be sold in equilibrium?

(b) A tax of \$36 is imposed on suppliers for each unit of apples that they sell. How many apples will be sold after the tax is imposed?

(c) A tax of \$36 is imposed on consumers for each unit of apples that they buy. How many apples will be sold after the tax is imposed?

2. On a tropical island there are 100 potential boat builders, numbered 1 through 100. Each can build up to 20 boats a year, but anyone who goes into the boat-building business has to pay a fixed cost of \$19. Marginal costs differ from person to person. Where y denotes the number of boats built per year, boat builder 1 has a total cost function $c(y) = 19 + y$. Boat builder 2 has a total cost function $c(y) = 19 + 2y$, and more generally, for each i, from 1 to 100, boat builder i has a cost function $c(y) = 19 + iy$. If the price of boats is 25, how many boats will be built per year?

3. A monopolist is able to practice third-degree price discrimination between two markets, so it can charge different prices in the two markets and prevent resale. The demand function in the first market is $q = 500 - 2p$ and the demand function in the second market is $q = 1,500 - 6p$. The marginal cost is constant at c per unit of output. To maximize his profits, should he charge a higher price in the first market or the second market?

4. Tina consumes apples (a) and butter (b). Apples cost p_a and butter costs p_b. Tina's income is M. Her utility is given by $u(a, b) = 2 \ln a + \ln b$.

(a) What is Tina's marginal rate of substitution between apples and butter?

(b) Find Tina's optimal consumption bundle as a function of prices and income.

(c) For apples, calculate Tina's price elasticity of demand.

(d) What happens to Tina's demand for butter if p_a doubles?

(e) Now imagine that Tina is trapped on an island, with an allocation of 7 apples and 3 lumps of butter. From now on, we assume that the price of apples is 1. The only income that Tina now gets is from selling her allocation of apples and butter. Calculate Tina's demand for butter as a function of p_b.

(f) Also on the island is Stanley. He has exactly the same preferences as Tina, but has 8 lumps of butter and 2 apples. Draw an Edgeworth box for this economy, and sketch both Tina and Stanley's indifference curves that pass through their initial endowment. (*You need to label the axes, label the curves, and mark important points.*)

(g) Write down Stanley's demand for butter as a function of p_b.

(h) What is the equilibrium price of butter in this economy? What are the equilibrium allocations for Tina and Stanley?

5. Henry can work as many hours as he likes within a day at a wage rate of \$40 per hour. Henry likes both consumption (C) and leisure (L), and leisure is defined as the hours within a day that he does not have to work. His utility function is given by:

$$U(C, L) = C \cdot L$$

The price of consumption is \$1 and a day has 24 hours.

(a) Suppose Henry has no other sources of income. Write down his budget constraint. Sketch his budget constraint, with leisure on the horizontal axis and consumption on the vertical axis.

(b) How many hours will Henry choose to work?

(c) Now suppose that Henry's income gets taxed at 50% by the government. Write down his new budget constraint. Sketch his new budget constraint on *another* graph.

(d) How many hours will Henry choose to work? What is the substitution effect on leisure? What is the income effect on leisure? What is the total effect on leisure?

6. Jennifer will earn income this period and next period and she needs to decide how much to consume this period and next period. She earns \$200 in period 1 and \$410 in period 2. The interest rate is constant at 10%. Her utility function is given by:

$$u(c_1, c_2) = \ln c_1 + \frac{1}{1.10} \ln c_2,$$

where c_1 and c_2 are her consumptions in period 1 and period 2, respectively.

(a) Suppose Jennifer can save and borrow at the interest rate, 10%. What is Jennifer's intertemporal budget constraint? You do not have to simplify the expression.

(b) What is the optimal c_1, Jennifer's consumption in period 1? What about the optimal c_2, consumption in period 2?

(c) Now suppose that Jennifer cannot borrow money from the future because no one is willing to lend her money. However, she is still free to save at an interest rate of 10%. What are the optimal choices for c_1 and c_2 now?

7. Noah's utility function for money is given by $u(x) = \sqrt{x}$.

(a) What utility would Noah get if he received \$100 for sure? What about if he had a lottery ticket that gave him \$50 with a probability $\frac{2}{3}$ and \$200 with probability $\frac{1}{3}$? Is Noah risk averse or risk loving?

(b) What is the variance of the outcomes of the lottery described in part (a)?

(c) Noah's wealth is \$90,000. However, he lives in Alaska, and there is a $\frac{1}{6}$ probability that his house will be destroyed by a moose, 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 (denoted by F_{max}) that Noah would pay for insurance?

(d) Following part (c), would the insurance company make positive or negative expected profit if it sold insurance at price F_{max}? What is the least amount (denoted by F_{min}) that the insurance company would be willing to sell the insurance for (such that they make a non-zero profit)?

8. A small coffee company roasts coffee beans in its shop. The unroasted beans cost the company \$2 per pound. The marginal cost of roasting coffee beans is $\$(150-10q+q^2)/100$ per pound when q pounds are roasted. The smell of roasting beans imposes costs on the company's neighbors. The total amount that neighbors would be willing to pay to have the shop stop roasting altogether is $\frac{q^2}{20}$, where q is the number of pounds being roasted. The company sells its output in a competitive market at \$4.50 per pound. Assuming the coffee company owns the right to roast as much as they want, how much coffee will the company roast? What is the socially efficient amount of coffee for the company to roast?

9. Consider the market of used cars. p fraction of all used cars in the market are "peaches" and $1-p$ of them are "lemon." Both sellers and buyers know the fraction p. There exists asymmetry in information on quality of cars: each seller knows the quality of the car which he sells, but buyers can not observe the quality of each used car. Assume that the value of a peach is \$2000 for a seller and \$2500 for a buyer and the value of a lemon is \$1000 for a seller and \$1500 for a buyer.

(a) Derive the maximum price which a buyer will pay for a used car as a function of p.

(b) Derive the condition of p with which peaches will be sold in the market.

(c) Describe the market situation clearly when the actual p does not satisfy the condition in (b).

(d) Now a seller of a peach offers a warranty which promises to pay the buyer some agreed upon amount if the car turned out to be a lemon. Explain how this warranty works as a signal. What is the equilibrium behavior of buyers and sellers given that the promised refund (if a car turns out to be a lemon) is sufficiently large?

10. (Battle of the sexes) A couple can attend either a basketball game (B) or an opera performance (O) this evening. The husband would prefer basketball, while the wife would prefer opera. Both would prefer to go to the same place rather than different ones. If one goes to one's preferred place, he/she gets a payoff of 3 while the other gets 2; if they can't agree, then they are going nowhere and both get 0.

(a) Draw the payoff matrix.

(b) Identify all pure strategy equilibria, if any exists.

(c) Identify all mixed strategy equilibria, if any exists.