Microeconomic Theory I
Preliminary Examination
University of Pennsylvania

June 1, 2015

Instructions

This exam has 4 questions and a total of 100 points.

Answer each question in a **SEPARATE** exam book.

If you need to make additional assumptions, state them clearly.

Be concise.

Write clearly if you want partial credit.

Good luck!

1. (25 pts) Axel is a newsboy. He can choose whether or not to buy a fixed amount of newpapers to resell. If he buys none, his profit will be 0. If he buys the fixed amount, his profit will depend on how many consumers come to his newsstand. This amount is a random variable D given by

$$D = \begin{cases} 0 & \text{with prob } p \\ 50 & \text{with prob } 1-p \end{cases},$$

where $p \in (0,1)$. If Axel buys the newspapers, his profit will be

$$\pi = \begin{cases} -15 & \text{if } D = 0 \\ 35 & \text{if } D = 50 \end{cases}.$$

Axel's Bernoulli utility function for money is u, which is C^2, strictly increasing, and concave.

Barb also owns a newsstand. She faces the exact same supply and demand environment as Axel. The only difference is that she has a different utility function, v, which is also C^2, strictly increasing, and concave. Lastly, *Barb is strictly more risk averse than Axel.*

   (a) (5 pts) Show that $p_A \in (0,1)$ exists such that Axel's optimal decision is to buy the newspapers if and only if $p < p_A$ (he is indifferent in the knife-edge case $p = p_A$).

   (b) (10 pts) Letting p_B be the corresponding critical probability for Barb, prove which is larger, p_A or p_B.

Now suppose Axel, before deciding whether to buy the newspapers, is able to purchase perfect information about what his demand will be, i.e., Axel can learn whether $D = 0$ or $D = 50$. Obviously, if he acquires this information he will buy the newspapers if and only if he learns $D = 50$. Let I_A denote the maximum amount he is willing to pay for this information (I_A is the "value of information" to Axel). Let I_B be the corresponding amount for Barb.

   (c) (10 pts) Assuming $p > \max\{p_A, p_B\}$, prove which is larger, I_A or I_B.

2. (25 pts) The Superior Coffee Shop (Starbucks?) sells a card that entitles its owner to a 10% discount on (tall) cups of coffee for a year. Denote such cups of coffee for Ms. Consumer as good 1, i.e., let x_1 denote the number of such coffees she will consume in a year. All other goods are represented as good 2. Ms. Consumer has a strictly increasing utility function for $x = (x_1, x_2)$. Her Hicksian demand function for good 1 is

$$h_1(p, u) = \left(\frac{p_2}{p_1}\right)^{1/2} u.$$

Let B ("Buy price") be the maximum price Ms. Consumer would pay for this discount card. Let S ("Sell price") be the minimum price for which she would be willing to sell the card if she were to already own it. Let $p^0 = (p_1^0, p_2^0)$ denote the prices without the discount card, and $(p_1^1, p_2^1) = (.9p_1^0, p_2^0)$ the prices with the card.

   (a) (15 pts) Find the ratio B/S in terms of $u^0 = v(p^0, m)$ and $u^1 = v(p^1, m)$. Which is larger, B or S?

   (b) (10 pts) Professor Behavior proclaims that for any consumer, owning a good makes the consumer attached to it, so that he/she will not sell it except for a higher price than he/she would have been willing to pay for it before, i.e., that $B < S$. (This is the so-called "endowment effect".) Propose an experiment that can provide evidence to distinguish Professor Behavior's hypothesis from the prediction of neoclassical consumer theory (as learned in Econ 701). Explain your reasoning.

3. (25 pts) Consider an exchange economy with one physical good and two possible states of the world, denoted 1 and 2. There are two consumers, A and B. Before the state of the world is realized the consumers can trade Arrow-Debreu contingent commodities that specify consumption of one unit of the physical good conditional on the realization of the state.

   Each consumer $i = A, B$ is a subjective probability expected utility maximizer; his subjective probability of state 1 is $\pi^i \geq 0$. Consumer A is strictly risk averse with differentiable utility function $u(\cdot)$, while consumer B is risk neutral. Consumer i's endowment of the physical good in state k is $e_k^i > 0$.

   Assume an interior Walrasian equilibrium exists, and restrict attention to such equilibria.

   (a) (5 pts) Write first order conditions that characterize an interior Walrasian equilibrium of this economy.

   (b) (5 pts) Can the economy have more than one interior Walrasian equilibrium? Either explain why it cannot or provide an example.

   (c) (5 pts) Suppose a new technology materializes that perfectly and publicly predicts the state of the world prior to any trading. Explain whether this technology results in a Walrasian equilibrium that makes each consumer, A and B, better off, worse off, or equally well off as he was in the equilibrium before the technology.

   (d) (5 pts) For the special case that the two consumers agree on the subjective probability, $\pi_1^A = \pi_2^B$, give a closed form solution for the Walrasian equilibrium allocation and prices.

   (e) (5 pts) Suppose that consumer A's equilibrium consumption in state 1 is x_1^A. Can you predict whether increasing the consumer's subjective probability of state 1 to $\hat{\pi}^A > \pi^A$ would increase his Walrasian equilibrium consumption in state 1 when consumer B's subjective probabilities are held fixed, without knowing A's exact utility function?

4. (25 pts) Consider an economy with three agents, A, B, and C. Agent A owns house a, agent B owns house b, and agent C owns house c. Each agent has strict preferences over the three houses, prefers any house to no house, and can consume at most one house. We are interested in a competitive equilibrium in the housing market. There are no goods other than houses, so if agent $i \in \{A, B, C\}$ wants to buy house $k \in (a, b, c)$ at price p, agent i must sell his house for at least price p.

   (a) (8 pts) Suppose the three agents' preferences are

A	B	C
c	a	b
a	c	c
b	b	a

   Find competitive equilibrium prices for this economy. Are these prices unique?

   (b) (8 pts) Suppose preferences are such that A and B, but not C, have the same most preferred house. Who will get that house in a competitive equilibrium?

   (c) (9 pts) Suppose all three agents have the same most preferred house. Is there an allocation of houses in the core? Either explain why or provide a counterexample. (An allocation is in the core if and only if there is no coalition of agents which can reallocate their own house in a way that makes all agents in the coalition strictly better off than the proposed allocation.)