ECON5200 ADVANCED MICROECONOMICS,

Home exam fall 2010

Problem 1

(a) The textbook distinguishes between a positive and normative representative consumer. For both types, discuss under what condition aggregate supply be represented by the demand from a representative consumer?

(b) Duffie and Zame (”The consumption based capital asset pricing model”, *Econometrica*, **57**, 1279-1297, 1989) derives a pricing rule for assets using an representative consumer (page 1281). Does the use of a representative consumer in this model correspond to any of the definitions in the textbook? Explain.

(c) Why can the equilibrium price in this case be expressed in terms of the representative consumer?

(d) On page 1281 the approach is extended to a multiperiod framework. Write out the details and explain how the equation on page 1282 is derived.

Problem 2

(a) Define production efficiency. Does the definition apply if one of the produced goods is a public good?

(b) Diamond and Mirrlees (“Optimal Taxation and Public Production I: Production efficiency”, *American Economic Review*, Vol. **61**, No. 1 (Mar., 1971), pp. 8-27) derive optimal taxation rules. The key result for the one-consumer case is (20). Why does this equation imply production efficiency?

(c) Consider the case where a public firm is maximizing the production of a public good given a budget constraint. Does this satisfy the assumptions of Diamond and Mirrlees?

(d) The public firm in (c) is financed by the government, and the commodity taxes the firm pays is also paid to the government. Would it enhance efficiency if public firms were exempted from such taxes?

Problem 3

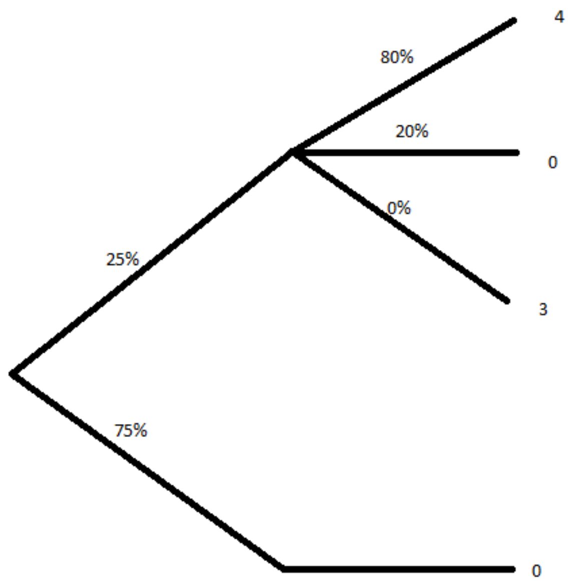
(a) Describe the independence axiom of expected utility maximization and explain why the independence axiom implies that for the lotteries below, if A is preferred to B then C is preferred to D. The lotteries are A: 4$ with 80% probability, B: 3$ with 100% probability, C: 4$ with 20% probability and D: 3$ with 25% probability. In all cases the lottery yields 0 with the remaining probability.

(b) Consider the case of rank-dependent utilities as in equation (3) in Diecidue and Wakker ("On the intuition of Rank-Dependent Utility". *Journal of Risk and uncertainty*, **23**, 281-298, 2001). Assume that the weighing function is

$$w(p) = \begin{cases} \frac{1}{2}\sqrt{2p} & \text{if } 0 \leq p \leq \frac{1}{2} \\ 1 - \frac{1}{2}\sqrt{2(1-p)} & \text{if } \frac{1}{2} \leq p \leq 1 \end{cases}$$

and assume a linear utility function. Show that the implied ranking of the lotteries in a) violates the implications of the independence axiom.

(c) Green ("Making a book agains oneself; the independence axiom and non-linear utility theory", *Quarterly Journal of Economics*, 1987, 785-796), introduces the concept of manipulation. Consider the three below with payoff given at the terminal nodes, and with indicated transition probabilities. Show that for a consumer with preferences as in (b) there is an acceptable simple manipulation that that will make the overall payoff distribution (seen from the root) inferior to the one in the given three.



(d) Green's Theorem 2 show that if and only if preferences violates the independence axiom, a consumer can be manipulated into accepting a stochastically dominated lottery. Discuss expected utility as a normative theory based on this result. Is the independence axiom a reasonable requirement of rational behavior?

Problem 4

(a) Consider a δ-discounted infinitely repeated game, where $0 < \delta < 1$. Abreu ("On the theory of infinitely repeated games with discounting", *Econometrica* **56**, 383–396) introduces the concept of an *optimal simple penal code*. What is a optimal simple penal code, and what does its existence depend on?

(b) Let a δ-discounted infinitely repeated game have the following stage game:

	L	R
T	4, 4	-1, 5
B	5, -1	0, 0

Determine an optimal simple penal code in this game when $\delta = \frac{1}{2}$.

(c) Abreu, Pearce and Stacchetti ("Toward a Theory of Discounted Repeated Games with Imperfect Monitoring", *Econometrica* **58** 1041–1063, building on "Optimal Cartel Equilibria with Imperfect Monitoring", *Journal of Economic Theory* **39**, 251–269) introduce self-generation as a means for analyzing δ-discounted infinitely repeated games with imperfect monitoring. Explain how this concept can be used to analyze δ-discounted infinitely repeated games with perfect monitoring.

(d) Consider the δ-discounted infinitely repeated game under part (b), with $\delta = \frac{1}{2}$. Show that $\{(1,3),(3,1)\}$ is a self-generating set.

Problem 5

Consider the signaling model in Section 13.C of Mas-Colell et al. and use sequential equilibrium as equilibrium concept. [Formally, we must turn the model into a finite game to use the concept of sequential equilibrium.]

(a) Why does the concept of sequential equilibrium imply that both firms have the same belief about the worker's type as a function of the worker's education choice.

(b) Characterize separating and pooling sequential equilibria.

Cho and Kreps (1987) ("Signaling games and stable equilibria", *Quarterly Journal of Economics* **102**, 179–222) present a refinement of the concept of sequential equilibrium, often referred to as the *intuitive criterion.*

(c) What sequential equilibrium outcome satisfies the intuitive criterion, and why?

(d) What happens with the sequential equilibrium outcome satisfying the intuitive criterion when λ (the probability of high productivity) approaches 1. And what if $\lambda = 1$? Discuss.

(e) Give a short overview of other and later contributions to equilibrium selection in signaling games. Discuss the relevance of these concepts.

Problem 6

Consider the hidden action model in Section 14.B of Mas-Colell et al. where effort is not observable.

(a) Provide an example of distributions $F(\pi|e_H)$ and $F(\pi|e_L)$ on $[\underline{\pi}, \bar{\pi}]$ such that the former first-order stochastically dominates the latter, but where the optimal compensation scheme for implementing e_H is not monotone.

(b) The paper by Holmstrom and Milgrom ("Aggregation and Linearity in the Provision of Intertemporal Incentives", *Econometrica* **55**, 303–328) is motivated by the apparent fact that real-world compensation schemes are simple, when compared to, e.g., the kind of optimal compensation scheme you have derived under point (a). Provide a detailed description of their analysis.