STUDIENZENTRUM GERZENSEE
STIFTUNG DER SCHWEIZERISCHEN NATIONALBANK

Swiss Program for Beginning Doctoral Students in Economics 1998

Exam in Microeconomics

Monday, July 27, 1998, 14.00h - 16.00h

1. You are allowed to use all material that you want (lecture notes, books, etc.) with the exception of PC's.

2. Please **do not** mention your name on top of the pages, but use your identification number from the enclosed list. The reason is that the exams will be graded anonymously.

3. Good luck!

ID-Number:____

Part I

Answer all questions. There are 60 points. Please allocate your time accordingly.

1. (15 points) Consider a utility function

$$x^{\varepsilon}y^{1-\varepsilon},$$

with $0<\varepsilon<1$ and a linear budget constraint. Show that the Marshallian demand functions violate homogeneity if $\varepsilon=\varepsilon(p_x)$, but do not violate homogeneity if $\varepsilon=\varepsilon(p_x/p_y)$.

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2. (20 points) In answering the following questions, use the cost function

$$\ln c(u,p) = \Sigma\alpha_k \ln p_k + u\Pi p_{k\beta}{}^{k}.$$

a) Derive the Hicksian demands, the indirect utility function, and the Marshallian demands.

b) What conditions must the α_k and β_k satisfy?

c) Luxuries are goods that take a larger share of the budget of higher income households. Necessities are goods that take a smaller share of the budget of higher income households. What determines whether good k is a luxury or a necessity?

3. (20 points) If preferences are additive, show that the uncompensated elasticities can be expressed as

$$e_{ii} = \phi e_i - e_i w_i(1 + \phi e_i) \quad \text{for } i=1,\ldots n$$

$$e_{ij} = - e_i w_j(1 + \phi e_i) \quad \text{for } i\neq j,$$

where $\phi = -\mu/x$ is a scalar not indexed on i, e_i is the expenditure elasticity, i.e., income elasticity, of good i, and w_i is the budget share of good i. (Hint: Utilize the symmetry of the Slutsky matrix and the fact that $\Sigma_k s_{ik} p_k=0$, where s_{ik} denotes an element of the Slutsky matrix.)

4. (5 points) If preferences are additive, so that elasticities can be expressed as in problem 3, can an econometrician estimate price elasticities from cross-section household budget data with almost no variation in relative prices? Explain.

Part II

1

a) *(10 points).* Draw an Edgeworth Box with an equilibrium at the boundary of the Box. Be precise in your drawing.

b) *(10 points).* In an Edgeworth Box the total endowments of every good is 5. We have an equilibrium for the initial endowment configuration where Mr. 1 has as initial endowment of 2 of every good and another for the configuration when Mr. 1 has an initial endowment 3 of every good. Show that it is possible for the equilibrium welfare of Mr. 1 to be worse in the second configuration than in the first.

2

We are in an exchange economy. A feasible allocation is a weak Pareto optimum if there is no other feasible allocation where every consumer is better-off.

a) *(10 points).* Show that a price equilibrium with transfers is always a weak Paretto optimum (i.e. the local non-satiation condition is not required).

b) *(10 points).* Argue that if preferences are strongly monotone (every good is desirable) then a weak Paretto Optimum is necessarily a Pareto Optimum.

3

a) *(10 points).* Show that if the preferences of a consumer are strictly convex, then for every budget set there is at most one consumption bundle that is best in the budget set.

b) *(10 points).* We are in the one consumer-one firm situation. Give an example of non-existence of equilibrium where the "blame" is in the production side of the economy.

4

Consider an economy with two goods (an input and an output), one firm and one or several consumers.

a) *(10 points).* Suppose the technology is of constant returns. Show that in this case there can be, whatever the number of consumers, at most one equilibrium involving positive production.

b) *(10 points)*. Show that if the technology is strictly convex (decreasing returns) and there is only one consumer (with possibly non convex preferences) the equilibrium price is unique.

5

There is a single physical good (consumption), two states and two consumers (with expected utility type preferences).

a) *(10 points)*. Show that if

i) every consumer has state utility functions which are identical across the two states, and

ii) the probability assessments of the two consumers are the same, then the state-contingent equilibrium is such that consumer 1 (and also consumer 2) consumes the same in the two states.

b) *(10 points).* Exhibit two (graphical) examples showing that i) and ii) in part (a) cannot be dispensed with for the validity of the result.