MICROECONOMICS QUALIFYING EXAM
SUMMER 2003

Give only your I.D. number
Open book.
Answer **four** of the following **six** questions.

Question 1.

Barbie consumes only two commodities, pieces of quiche x_1 and glasses of wine x_2. When the prices of quiche and wine (p_1, p_2) are (4,2), she consumes the bundle (2,2). When the prices are (2,1), she consumes (4,2).

(a) Explain why these data are consistent with utility maximization. Give an example, a third (p, x), that would be inconsistent with the first choice, p=(4,2), x=(2,2).

(b) Consider the utility function $u = x_1 + \ln(x_2)$. Is Barbie's behavior consistent with this equation? Sketch some indifference curves to illustrate.

(c) For the unobserved bundle x=(2,4) draw her *revealed referred* RP set, and also her *revealed worse* RW set. Discuss how the assumptions about preferences that lie behind this method are reflected in these sets?

Question 2.

Consider a society of 201 citizens who have rankings over three candidates (Al, George, and Ralph) as shown.

ranking	101 voters	100 voters
first	Al	George
second	George	Ralph
third	Ralph	Al

(a) Who is the "Condorcet winner," a candidate who beats all others in two-person contests? Who is the "plurality winner," the candidate who receives the most votes in a three-person race? Who is the "Borda winner," a candidate who wins by the Borda count?

(b) Could these particular rankings produce a social nontransitivity (voting paradox)?

(c) Relate this case to May's and Arrow's theorems. Are all of their conditions satisfied in this example?

(d) Do these theorems favor any of these three social decision rules? Which rule do you prefer, and why?

Question 3.

Minnie and Maxine exchange gizmos (good 1) and gadgets (good 2) in a pure exchange economy. Their utility functions and endowments are given as follows:

Minnie $\qquad U_a = \min(x_a^1, x_a^2), \quad \omega_a = (2,0)$

Maxine $\qquad U_b = \max(x_b^1, x_b^2), \quad \omega_b = (1,1)$

(a) Are their preferences convex? Monotone? Draw the Edgeworth box. Identify the strongly and weakly Pareto efficient sets and explain.

(b) Identify the core of this economy? Are there any Walrasian equilibria from ω?

(c) Plot the utility possibility frontier for this economy. Will Rawlsians and Benthamites be able to agree on a socially optimal allocation?

(d) Discuss the allocation x_a=(1,1) and x_b=(2,0) in relation to the theorems of welfare economics.

Question 4.

Tom, Dick and Harry share an apartment at Quasilinear Gardens. They each derive benefit from apartment cleanliness G, a public good, and leisure x, a private good. Their utility functions and endowments are

Tom, "slob,"	$U_t = x_t + 2\ln(G),$		$\omega_t = 9,$
Dick,	$U_d = x_d + 3\ln(G),$		$\omega_d = 9,$
Harry, "neatnik,"	$U_h = x_h + 5\ln(G),$		$\omega_h = 9.$

Production of cleanliness and leisure takes place according to the transformation function,

$$T(G, x_t, x_d, x_h) = G + x_t + x_d + x_h - \omega_t - \omega_d - \omega_h = 0.$$

(a) Find the Lindahl equilibrium, (G, x_t, x_d, x_h).

(b) Given that taxes are set so that each roommate must contribute an equal share $\left(\dfrac{G}{3}\right)$, find the median voter's preference for cleanliness.

(c) What conditions are necessary in general to guarantee that these equilibria give the same value G? Are these satisfied here?

(d) Explain why a voting paradox does not arise in this Bowen democracy. Use the alternatives $G=6$, 9 or 12 to illustrate. Comment on the wider implications of this example.

Question 5.

Yao's money metric utility function is given by

$$\mu(q, p, m) = m\sqrt{\frac{(q_1)^2 + (q_2)^2}{(p_1)^2 + (p_2)^2}}$$

where q is a "base" price vector and (p, m) is some particular price-income combination.

(a) Obtain an equation for Yao's Marshallian demand curves for good 1.

(b) Calculate his equivalent variation and compensating variation for a price increase from $p^o = (1,1)$ to $p' = (2,1)$ with income unchanged ($m^o = 1$, $m' = 1$). What compensation does he require to accept the higher price?

(c) Explain the difference between the consumer surplus, equivalent variation and compensating variation of a price increase. Which should be used to measure this cost in a cost-benefit analysis? How could such costs to a group of consumers with preferences identical to Yao's, but with different incomes be aggregated? What principle(s) of utility measurement is illustrated by this example? Illustrate your answer with a drawing.

Question 6.

Wendy produces burgers y by combining grills x_1 and labor x_2.

(a) Wendy's cost function is $c(w_1, w_2, y) = (w_1 + w_2)y$, where w_1 is the rental rate for grills and w_2 the wage rate. What is her production function? Is it homogeneous of degree 1? Monotonic? Convex? Plot the isocost and isoquant curves; give an interpretation the slopes for this case.

(b) Suppose that the rental rate for grills is $w_1 = 1/2$; the wage rate is $w_2 = 1/2$, and that the demand given by the function $p(y) = 3 - y$. And, suppose that this market is competitive. What is its equilibrium?

(c) Suppose two firms (Wendy and Mac) share this market; they behave as a Cournot duopoly. Entry by a third firm has been legally blocked. Factor prices and demand remain unchanged. What is the Nash equilibrium?

(d) Suppose that the Mac workers unionize and succeed in raising their wage rate, while Wendy's wage rate remains unchanged. How does the Nash equilibrium change? Are there any circumstances in which Mac would chose to exit the burger industry? Illustrate your answer with reaction curves.