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Econ 101A – Spring 2003 — GSI: Zhiyong An, Jeffrey Butler

FINAL EXAMINATION

Question 1(60 points): True/False/Definitions:
Define all underlined terms. Decide whether the statement is true or false. If the statement is false, explain why.

a) If a consumer is utility maximizing, an optimal bundle of goods always requires the marginal rate of substitution between each pair of goods to equal the ratio of their respective prices.

b) In an Edgeworth box -- i.e., a 2-person, pure exchange economy -- for any initial endowment a competitive equilibrium will be Pareto optimal if preferences are convex.

c) If preferences over lotteries satisfy transitivity, continuity, independence and "reduction of compound lotteries" (a.k.a. consequentialism), then the expected utility hypothesis is satisfied.

d) The Nash bargaining solution is the only social welfare functional that satisfies Independence of Utility Origins, Independence of Utility Units, the Pareto Property, Symmetry, Rationality and Independence of Irrelevant Alternatives.

e) For price-taking, profit-maximizing firms, profit functions are homogenous of degree zero in prices.

f) A price-taking, profit-maximizing firm could have upward-sloping factor demand functions. (nothing to define here).

g) In a two-person, two-good economy, the slope of the Scitovsky contour is equal to the consumers' (common) marginal rate of substitution between the two goods.

h) In any normal form game, at least one pure strategy Nash equilibrium always exists.

i) A utilitarian social welfare function does not require interpersonal utility comparisons.

j) Convexity of individual preferences is necessary for the existence of Walrasian equilibrium in a competitive, pure exchange economy.

Question 2 (40 points):
Fred is an expected utility-maximizing driver who likes to speed. He can either exert self-restraint (at a high effort) and therefore drive safely, or self-indulgence (with low effort) and drive unsafely. Let high effort be represented by e=1 and low effort by e=0.

Suppose further that Fred's preferences over effort and wealth are represented by the utility function $u(w,e)=w^{0.5} - e/3$.

Suppose Fred has an initial wealth of $100. If Fred gets in an accident, he incurs a $51 loss. The probability that Fred gets in an accident depends on his effort level: if e=0, Prob(accident)=2/3; if e=1, Prob(accident)=1/3. Assume there are no other costs associated with the accident besides the $51.

a) What is Fred's expected utility if he drives safely?

b) What is Fred's expected utility if he drives unsafely?

c) Will he drive safely or unsafely?

Now, assume there is only one insurance company in existence and only one policy available: Full insurance. That is to say, the insurance company charges a fixed premium and then pays Fred $51 if he gets in an accident. The insurance company does not know Fred's effort level, and so guesses that there is a probability of ½ that Fred drives safely.

d) If the insurance company is risk neutral, what is the minimum premium they will charge?

e) Will Fred pay this minimum premium? (Note: $(74.5)^{0.5}$ is approximately 8.6)

f) If your answer to e) was yes, will Fred then drive safely given that he is fully insured?

g) If the insurance company knew your answer to f), would they want to raise of lower their premium?

Question 3 (40 points):
Initially there is one firm in a market for cars. The firm has a linear cost function: $C(q)=2q$. The market inverse demand function is given by $P(Q)=9-Q$.

a) What price will the firm charge?

b) What quantity of cars will the firm sell?

c) How much profit will the firm make?

Now, a second firm enters the market. The second firm has an identical cost function.

e) What will the Cournot equilibrium output for each firm be?

f) What is the Stackelberg equilibrium output for each firm?

f) How much profit will each firm make in the Cournot game? How much in Stackelberg?

g) Which type of market do consumers prefer: monopoly, Cournot duopoly or Stackelberg duopoly? Why?

Question 4 (20 points):
Consider the normal form coordination game:

	L	R
U	3, 2	1,1
D	1,1	2,3

a) Find all the pure strategy Nash equilibria.
b) Find all the mixed strategy Nash equilibria and determine the payoffs to both players.

Question 5 (20 points):
Suppose that the economy is composed of two industries. Product ***1*** is produced in a competitively organized industry while the product ***2*** is made in one which is run as a profit maximizing monopoly. Suppose further that there is only a single factor of production that is available in fixed supply. Suppose no other departures from competitive conditions (except for the monopoly).

Convince me that if more of product ***2*** were produced (and consequently, less of product ***1*** then all consumers could be made better off. Could the opposite be true as well?