EEP 100 FINAL EXAM

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Questions marked $(\mathbf{T}, \mathbf{F}, \mathbf{U})$ should be answered "True," "False," or "Uncertain," and your answer should be briefly justified. Note that points will be awarded based only on your reasoning, not on the answer itself, even if correct.

- (1) Suppose that at an initial cost of \$1000, a homeowner can insulate his house and same \$50 each year in heating bills. What is the highest interest rate at which the homeowner should insulate?
- (2) (T,F,U) "Prices for the same product vary widely between member states. Often this may be due to differing national tastes and traditions: the supply of sauerkraut should be more plentiful, and prices lower, in West Germany than in Britain." (*The Economist*, 11/27/1982)
- (3) (T,F,U) The price elasticity of the Marshallian demand function will always be greater than the price elasticity of the Hicksian demand function, because while the change in the Hicksian demand measures only the substitution effect from a price change, the change in Marshallian demand is equal to the substitution effect plus an income effect.
- (4) (T,F,U) An influential study of the cigarette industry notes that "In 1918, for example, Lucky Strike [cigarettes] were sold for a short time at a higher retail price than Camel or Chesterfield and rapidly lost half its business" (Tennant 1961). However, since a USDA study using the same data estimates that the price elasticity of cigarette demand is between 0.3 and 0.4, at least one of these studies must be mistaken.
- (5) Some observers regard population growth as a serious problem which threatens the welfare of future generations. One argument advanced in support of this view is that the private benefits of children to parents may be greater than the social benefits of the additional child to society. Let us suppose that the government wishes to pursue a policy of zero population growth. Consider three alternative policies designed to accomplish that end:
 - a) Limit each female to no more than two children.
 - b) Issue two permits to each female. The holder of a permit is permitted to give birth to one child; these permits can be traded.
 - c) The government auctions permits to have children, limiting the total number of permits issued to twice the female population. Revenues from this auction are redistributed to the population in the form of a uniform lump sum transfer.
 - d) The government imposes a per-child tax. Revenues from this tax are redistributed to the population in the form of a uniform lump sum transfer.

Suppose that there are equal numbers of two types of households; those who love children, and those who are indifferent to them. Both types also value income (as it allows them to purchase other goods), but have diminishing marginal utility of income. Prices of other goods p are proportional to the size of the population, n; the private cost of having a child is q.

a) What is the appropriate commodity space for analyzing this problem? Devise a simple ordinal utility function (satisfying the usual axioms) for representing the preferences of both types of households.

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- b) Suppose that each household has an income of \$10,000. Using the ordinal utility functions you've constructed, compute the Marshallian demands of both types for both children and other goods (you may which to assume that children are infinitely divisible, for simplicity).
- c) Compute the marginal rate of substitution between children and other goods for both types of households. Use the result to describe the contract curve (both mathematically and graphically, in an Edgeworth box).
- d) Using your development of the problem so far, compare and contrast the effects of the three different policies on (a) the population; (b) the distribution of income; (c) the distribution of utility across the population.