Midterm Examination

Intermediate Microeconomics (Honors)

Fall 1998

Name:

Carefully read each question before answering. If a question seems ambiguous, clearly state your interpretation of it before answering. Show all intermediate steps used in arriving at a conclusion. Clearly indicate your final response to each answer.

Part I. True, False, or Uncertain. Write **T**, **F**, or **U** for the response you believe most accurately characterizes the validity of the statement. Give a short but detailed justification of your response in the space provided. Use mathematical, graphical, or verbal arguments as appropriate. Each question is worth 6 points.

1. An individual has a utility function given by $U(x_1,x_2)$, with $\partial U(x_1,x_2)/\partial x_1 > 0$ and $\partial U(x_1,x_2)/\partial x_2 < 0$ for all values of x_1 and x_2. The individual's demand for x_1 will be independent of the price of x_2.

2. If an individual has a utility function given by $U(x_1,x_2) = \alpha \ln(x_1) + \beta \ln(x_2)$, with $\alpha > 0$ and $\beta > 0$, then neither x_1 nor x_2 can be a luxury good.

3. If a good has a compensated substitution elasticity of $-.5$ and an income elasticity of -1, it is a Giffen good.

4. An individual with a utility function defined over consumption given by $U(C) = -1/C$ will never accept a fair bet.

5. An individual with a utility function given by $U(x_1, x_2) = x_1 + \ln(x_2)$ will always consume a positive amount of x_2.

6. An individual has a utility function defined over the consumption of a market good (c) and leisure (l), where $U(c, l) = .5\ln(c) + .5\ln(l)$. If the individual earns no more than 100 dollars, the tax rate on her earnings is .2, while every dollar of earnings beyond the 100^{th} is taxed at the rate .5. If the individual is paid a (gross) wage of 5 per hour, and if she works, she will never choose to work 20 hours.

Part II. **Problems**.
Answer each part of each of the following problems. Remember to show all of your work.

1. (18 points) A population of N individuals is evenly divided between type A and type B individuals. These people are all otherwise identical except for the fact that type A individuals have no nonlabor income ($I_A = 0$) while type B individuals have nonlabor income $I_B = 5$. All individuals in the population have a utility function defined over a consumption good X and leisure l which is given by $U(X,l) = .5\ln(X) + .5\ln(l)$. Each person's time endowment (T) is equal to 1 and the price of X is equal 1.
   a. Find the reservation wage of a type A individual, and then find the reservation wage of a type B individual.

   b. If the market wage rate is 5 [that is, the wage rate offered to *all* individuals] determine the total amount of labor supplied to the market.

   c. If the government imposes a tax rate of .5 on nonlabor income only, determine the total amount of time supplied to the market.

2. (16 points) An individual with a wealth endowment of 10 (W) has a utility function defined with respect to income which is $U(I) = \ln(I)$. He has the opportunity to purchase a risky asset. Given tht Y units of the risky asset are purchased, in the good state of the world his total income will be $W + r_g Y$, and in the bad state of the world his total income will be $W + r_b Y$. Let the probability of the good state of the world be .5 and the probability of the bad state be .5.
   a. If $r_g = 1$ and $r_b = -.5$, how much of the risky asset will the individual buy so as to maximize expected utility?

   b. If the net rate of return in the bad state changes from −.5 to -1, how much will the individual invest?

3. (30 points) An individual lives for two periods and seeks to maximize her expected lifetime income. Her income is 0 in each period she doesn't participate. If she searches for a job, she pays a cost of 1 in each period in which she searches. Every period in which she searches she is offered a job. With probability .25 the job offer pays 1 in each period of employment and with probability .75 it pays 5 in every period of employment. If the individual accepts a job in the first period she keeps the same job in period 2. Jobs begin in the period in which they are accepted. Offers rejected in period 1 (that is, an offer from a particular firm) cannot be accepted in later periods.
   a. If the individual enters her second period of life without a job, will she search for one? If so, which wage offers will she accept?

   b. Will the individual search for a job in her first period of life? If so, which wage offers will she accept?

   c. What is the probability that the individual will be without a job during period 1? What is the probability she will be without a job during period 2?

d. If the cost of search increases to 3 for each period in which search takes place, what proportion of individuals will not be employed during period 1?

e. If the cost of search increases to 9 for each period in which search takes place, what proportion of individuals will not be employed during period 1?