

Preliminary Exam in Microeconomics
M.A. Level . August 2000
George Mason University
(Carrie Meyer, Ron Heiner, Robin Hanson)

Part I. True-False-Uncertain. State whether each of the following statements is true, false, or uncertain and explain briefly your answer. Illustrate if useful with a carefully labeled graph.

- a. Indifference curves cannot intersect one another because the consumer is rational.
- b. Convex indifference curves are consistent with both corner solutions and interior solutions, but concave indifference curves always lead to corner solutions assuming that the consumer faces fixed commodity prices.
- c. The cross price elasticity of demand is likely to be positive for fishing poles and fishing licenses.
- d. A demand function that is linear in logs will have a constant elasticity of demand.
- e. Of two parallel demand curves, the one further to the right has a smaller price elasticity at each price.
- f. Since long-run Average Cost (LRAC) cannot exceed short-run Average Cost (SRAC), the LRAC curve consists of all the minimum points of the SRAC curves.
- g. Wonder Widgets Inc. uses two inputs: Labor and Capital. The Marginal Product of Labor at the current output level is 3 and the Marginal Product of Capital is 2. Labor is bought for \$5 per unit and capital for \$4. Since capital is cheaper than labor, the firm could hire more capital and less labor to produce the same output at a lower cost.
- h. If the supply curve of a factor is perfectly elastic, Marginal Factor Cost is identical to the supply curve.
- i. As we move along the Contract Curve in an Edgeworth box, we are achieving varying degrees of Pareto efficiency in consumption.

Part II. Problems:

1. Marge likes money (as we all do) and has a utility function of $U = (\$)x^2$. She goes to Atlantic City to play roulette and bets her money on number 16. (There are 36 numbers on the roulette wheel, and the wheel is fair. Thus, each number has one chance in 36 of winning) If Marge's number comes up, she wins \$50. If the number does not come up, she loses her money and her wealth is decreased by the size of her bet. Let us say that her wealth is \$10, so that a win at roulette will increase her wealth to \$60 minus the amount of the bet and a loss will reduce it to \$10 minus the bet.
 - a. Graph Marge's utility function.
 - b. What is the maximum amount of money Marge will want to bet? (She should be just indifferent between placing the bet and not placing it.) You will need to use the quadratic formula to solve for the amount of the bet: $[-b \pm \sqrt{b^2 - 4ac}] / 2a$
 - c. What bet would make this a fair gamble for a risk neutral casino? Is the bet greater or less than Marge's bet? What explains the difference?

2. At a certain school, the demand by boys for dates with girls is $Q = 4 - 2p$ while the demand by girls for dates with boys is $Q = 3 - p$. If one sex "pays" the other for dates, then who pays more for dates, boys or girls? Show your work and explain.
3. Michelle is discussing with her cousin Mike the relative benefits of working more or less now that she has received a cut in her wage at her part-time job. Mike insists that she should work less since at the new lower wage it hardly seems worth it to work, but Michelle is considering the new outfit that she wants to buy and decides to work more hours at her job this week.
 - a. What is the equation of the Michelle's budget constraint over the two goods income and leisure. Call Income I and leisure Z .
 - b. Above we said that Michelle decided to work more at the lower wage rate. What does this imply about the income and substitution effects of the wage decrease? (Assume that both income and leisure are goods for Michelle and assume that leisure is a normal good. Additionally her marginal rate of substitution of income for leisure is declining.)
 - c. Illustrate the situation, carefully indicating the income and substitution effects.
 - d. Under the above assumptions, how would nonwage income affect Michelle's choice of leisure? Letting nonwage income be N , present and explain the Slutsky equation for labor supply with response to a wage change.
4. Set up the first and second order conditions for maximizing profits of a competitive firm that utilizes two inputs. Then use these conditions and comparative static analysis to demonstrate that optimal input demand functions are downward sloping.