

U8216 Microeconomics and Policy Analysis (Section 3)
Fall 2000
Problem Set 4

1. Ross spends his money on commercials and cheap suits. Suppose the price of a commercial goes up 10% and his income goes up 5% and suppose that Ross initially spends half his money on each. Is it true that he is neither better nor worse off from these changes? Illustrate your answer with an indifference curve and a budget constraint, and explain intuitively in words your answer
2. Suppose we aggregate everyone's individual demand curves and get a market demand for Soy lent Green. Let the demand curve be represented by $Q(s) = 10 - P_s$. What is the elasticity of demand when $P_s=5$, $P_s=1$, and $P_s=9$?
3. "Jack Sprat could eat no fat, his wife could eat no lean." Draw the contract curve.
4. Donald and Elizabeth have preferences over houses and boats. Their preferences can be represented by the following utility functions:

$$U(\text{Donald}) = 30h^{0.25}b^{0.75}$$
$$U(\text{Elizabeth}) = .50h^{0.5}b^{0.5}$$

Prices are $P_h=\$10$ and $P_b=\$15$. Don is consuming $5h$ and $10b$, and Liz is consuming $12h$ and $8b$.

- a. Determine the MRS for both Don and Liz.
 - b. Determine if the two have reached an exchange equilibrium. If not, can they both be made better off by further exchange?
 - c. Are there other points of equilibrium? Explain.
 - d. Suppose that Don's MRS were greater than Liz's MRS. Could they be made better off? Explain concretely and intuitively in words why or why not.
5. Suppose the annual demand for Dan's two-hour lecture on "Homelessness Among the Ancient Romans" (to which he shows up toga-clad, speaking grammatically-correct Latin) is described by the following relationship (ceteris paribus): $Q(P) = 120 - 4P$, where P is his speaking fee.
 - a. What is the elasticity of Dan's demand curve when Dan sets his speaking fee at \$10 (assume he can give full and partial lectures)?
 - b. What is the elasticity when Dan sets his speaking fee at \$25?
 - c. Why are the elasticities different? How much revenue does Dan earn in each case?

- d. Graph the relationship between Dan's revenue from speaking and his speaking fee. Find the fee that gives him the greatest revenue. (Hint: revenue is just PQ .) Explain intuitively what is happening when a speaking fee hike causes revenue to rise and what is happening when a speaking fee hike causes revenue to fall.
- e. What is the elasticity at this point?
- f. Explain the relationship between the price elasticity and a change in revenue.
- g. (*extra credit — 0 points*) Explain Dan's motto: Veni, Vidi, Vino.
6. A million years ago, only two kinds of goods, wild boar and berries, were available. Two individuals, Ayla and Durc, lived in a particular forest and had no access to neighboring tribes. Ayla has the usual negatively-sloped, convex indifference curves. Durc, however, likes only wild boar, but any berries he acquires can be costlessly fed to the snakes in the forest. There are 10 pounds of wild boar and 10 bushels of berries in the forest. Each individual is endowed with 5 units of each commodity.
- a. Show the initial situation in an Edgeworth box diagram.
- b. Show the set of all Pareto-optimal outcomes of trade.
- c. If Durc and Ayla end up at a Pareto-optimal allocation after a trade, will Durc be left with some of the berries? Explain, using a diagram.
7. (*optional*) For some reason, you find yourself at a hearing on proposed MTA subway fare increase from \$1.50 to \$2.00.
- a. A city council member from Canarsie says that a study shows that the price elasticity of demand for subway rides is 1.4 (in absolute value). If the council member is correct, what is the percentage decrease in rider-ship that the fare hike will cause?
- b. What is the percentage change in MTA revenue resulting from the fare hike?
- c. A council member from Riverdale says that the member from Canarsie is blind and didn't read the study right. The study really said that the elasticity is 0.14 (in absolute value). If this is correct, what is the percentage decrease in rider-ship from the hike?
- d. What is the percentage change in MTA revenue resulting from the fare hike?
- e. Which figure indicates that voters will be unhappier about the fare hike?
- f. Politicians are concerned about the distributional issues involved in an MTA fare hike. How elastic is demand for subway rides for the following groups? Justify your answers. Which groups will be hard hit by the fare increase:

- i. Commuters who live in Brooklyn and Queens but work in Manhattan?
- ii. Unemployed inner-city dwellers?
- iii. Columbia students who have limited spending money and live in student housing near the University?

8. (*optional*) You can get from Newark to Woodbridge, NJ, either by car or train. There are 1,000 identical clones who make the same trip daily. All they care about is the time the trip takes (assume money costs are the same). Currently, the time it takes to traverse Route 1, with its many potholes, is described by:

$$T_1 = 10 + \frac{F_1}{25},$$

where F_1 is the number of other people using Route 1. Time increases as more people travel on route 1 due to congestion. Time on the railroad is given by:

$$T_2 = 20 - \frac{F_2}{300},$$

where F_2 is the number of people taking the train. The smaller the number of railroad commuters, the worse the schedule becomes.

- a. Find the equilibrium travel time on each route.
- b. The state of New Jersey plans to remove all potholes on Route 1 so that travel time will be:

$$T_1 = 10 + \frac{F_1}{75}.$$

Find the new equilibrium.

- c. How much better off are people due to the new policy?

9. (*optional*) Consider an economy with no production. The economy is endowed with 50 bushels of alfalfa (a) and 50 bushels of barley (b). Two individuals, Mary and Larry, live in this economy and have the usual convex, negatively-sloped indifference curves. Larry has an initial endowment $(a,b) = (50,0)$, and Mary has an initial endowment $(a,b) = (0,50)$. This initial endowment is not on the contract curve. At the initial endowment, Larry's and Mary's marginal rates of substitution of b for a are, respectively, 2 and 5. (Define the MRS of b for a as $\left| \frac{\Delta b}{\Delta a} \right|$.)

a. If Mary offers a trade whereby she would give Larry three of her barley for one of his alfalfa, would Larry accept the trade? Why or why not? Illustrate your answer. Show, on the same diagram, the set of efficient trades these individuals would rationally make.

b. Now introduce prices. One of the points on the set of efficient trades you illustrated in your diagram will be a competitive equilibrium. Show such a point and illustrate the equilibrium price ratio $\frac{P_a}{P_b}$.

10. (*optional*) Adam and Eve lived happily in Plentyland until Claudio became the dictator. They had no assets, but they each worked every day for P\$1 per year. (P\$ is the symbol for a Plentyland dollar.) Adam worked as a herpetologist, and Eve was a pomologist. When Claudio became dictator, however, he forced them into a labor camp. They worked very hard and were paid nothing. Nobody else was sent to the labor camp. Adam worked for 50 years, and Eve worked for 75 years before they were released in the revolution that ended Claudio's dictatorship. Claudio fled to New York, where he took the profits he had made from the labor camp and spent some of them on loose women, lottery tickets, and Columbia University tuition. Then he was tracked down, but rather than be captured and forced to stand trial for his crimes against humanity, he committed suicide by attending three consecutive microeconomics courses and taking copious notes. When the police recovered his body they found his bank accounts. Adam and Eve have asked for restitution, but it is quite possible that there will be less than P\$125 in the account.

a. Graph the amount of restitution Eve would get as a function of the amount in the bank account if Rashi's rule is used.

b. Do the same if Aristotle's rule is used.

c. Do the same if Maimonides' rule is used.