ECO 300 – MICROECONOMIC THEORY
Fall Term 2005
PROBLEM SET 1
Due 12.30 p.m. on Thursday September 29

QUESTION 1: (Total 12 points; 1 each for nos. 1-8, 2 each for nos. 9, 10)

Multiple choice – simply write the letter for the best answer

1. Economics is about the allocation of scarce resources. Which of the following is NOT an example of economic scarcity?

a. If Steve goes to see the movie The Exorcism of Emily Rose on Saturday, he will not be able to afford buying ice cream.
b. If Jenny studies for her economics quiz this evening, she will not have time to walk her dog.
c. If General Motors increases its production of SUV's this year, it will have to spend more on advertising.
d. If Borders Books increases the number of titles it carries, it will have to reallocate shelf space to accommodate the new titles.

2. Which of the following is a positive statement about the economy?
a. Overtime work should be paid at a higher rate because the marginal disutility of labor is increasing.
b. A fundamental assumption of the economic theory of consumer behavior is that consumers always prefer having more of any good to having less of it.
c. Because many adults cannot afford to go to college, tax credits for tuition should be introduced.
d. All of the above.
e. None of the above.

3. Which of the following is a normative statement?
a. The taxes paid by the poor should be reduced in order to improve the income distribution in the U.S.
b. State governments ought not subsidize corporations by training welfare recipients.
c. Presidential candidates should not be given funds from the federal government to run campaigns.
d. The sea otter should not be allowed to spread into Southern California coastal waters, because it will reduce the value of fisheries.
e. All of the above.

4. Which of the following markets has the most restrictive geographic boundary?
a. The market for retail gasoline.
b. The market for housing.
c. The market for gold.
d. The market for beef.

5. Which of the following would shift the supply curve for gasoline to the right?

I. A large increase in the price of public transportation.
II. A large decrease in the price of automobiles.
III. A large reduction in the costs of producing gasoline.

a. I only.
b. II only.
c. III only.
d. II and III only.

6. Which of the following would cause an unambiguous decrease in the real price of DVD players?

a. A shift to the right in the supply curve for DVD players and a shift to the right in the demand curve for DVD players.
b. A shift to the right in the supply curve for DVD players and a shift to the left in the demand curve for DVD players.
c. A shift to the left in the supply curve for DVD players and a shift to the right in the demand curve for DVD players.
d. A shift to the left in the supply curve for DVD players and a shift to the left in the demand curve for DVD players.

7. Consider the demand curve of the form $Q = a - bP$. If a is a positive real number, and $b = 0$, then demand is

a. completely inelastic.
b. inelastic, but not completely.
c. unit elastic.
d. elastic, but not infinitely.

8. Suppose the demand for coffee can be represented by $Q = a I – b P$, where a and b are positive real numbers. When income I rises, the price elasticity of demand for coffee in numerical value (that is, stripped of the negative sign):

a. decreases at every price.
b. decreases at the price that prevailed before the change in income
c. increases at every price
d. increases at the price that prevailed before the change in income

9. If a hurricane hits Florida's orange growing regions, this will:

a. result in a sharp increase in the price of oranges in the short run because demand and supply are highly inelastic.
b. result in a sharp increase in the price of oranges in the short run because demand and supply are highly elastic.
c. result in a sharp decrease in the price of oranges in the short run because demand is highly inelastic and supply is highly elastic.
d. result in little change in the price of oranges in the short run because supply is infinitely elastic.

10. There are two techniques of egg production: free range (where hens roam around the farm) or factory (where hens are fed and watered in wire cages). The free range technique has a much more elastic supply curve than the factory technique. When the demand for eggs falls:

a. egg production falls by a smaller percentage in the factory technique than in the free range technique.

b. egg production falls by a larger percentage in the factory technique than in the free range technique.

c. the production using both techniques falls by the same percentage.

d. the factory egg producers supply curve shifts inward.

e. the free range egg producers supply curve shifts inward.

QUESTION 2: (Total 20 points, 10 for each of parts a and b)

The daily demand for hotel rooms on Manhattan Island in New York is given by the equation

$Q_D = 250{,}000 - 375\ P$. The daily supply of hotel rooms on Manhattan Island is given by the equation $Q_S = 15{,}000 + 212.5\ P$.

(a) Diagram these demand and supply curves in price and quantity space. What is the equilibrium price and quantity of hotel rooms on Manhattan Island?

(b) Calculate: (1) The arc elasticities of demand and supply taking the end-points of the arc at prices of $300 and $500. (2) The point elasticities of demand and supply at the equilibrium price.

QUESTION 3: (Total 20 points)

Suppose that due to more stringent environmental regulation it becomes more expensive for steel production firms to operate. Also, recent technological advances in plastics have reduced the demand for steel products. Use Supply and Demand analysis (draw an appropriate diagram with accompanying explanation) to predict how these shocks will affect equilibrium price and quantity of steel. Can we say with certainty that the market price for steel will fall? Why, or why not?

QUESTION 4: (Total 13 points, 5 for each of a and b, 3 for c)

(a) Al Cohl cares only about the total amount of alcohol he consumes. Gin has 40% alcohol and Vermouth has 20% alcohol. Sketch Al's indifference map (draw two or three indifference curves). Find a utility function to represent his preferences.

(b) Martin Dryer drinks martinis in which the ratio of Gin to Vermouth must be precisely 7:1. If extra quantities of one or the other are available, he has no use for them. Sketch Martin's indifference map.

(c) In what sense do the preferences of Al and Martin represent the extremes of the possible range of preferences over two goods?

QUESTION 5: (35 points)

Picture yourself in the following nightmare scenario. The exam period is upon you. Two of your courses have scheduled final exams: Mathematical Methods, and French Fiction. You have calculated that after meeting other commitments, you have 30 hours of studying time available. You have also calculated that your GPA (G) is related to the number of hours you spend studying for the two exams (M and F respectively) by the following formula:

$$G = 0.1 \quad M + 0.2 \quad F - 0.005 \; F^2$$

(a) (2 points) What is your "time-budget constraint"?

(b) (8 points) Substitute for M using the budget constraint to express G as a function of F alone. Calculate the choice of F that maximizes your GPA. What is the resulting GPA?

(c) (12 points) Solve the same problem using Lagrange's method. What is the solution for the number of hours you study for Mathematical Methods? What is the solution for the Lagrangian?

(d) (8 points) Not satisfied with the GPA you would get, you somehow manage to free up an extra five hours for studying. Re-solve the problem with 35 hours of total time instead of 30. What is the optimal choice of M and F? What is the resulting GPA?

(e) (5 points) Suggest economic explanations for the differences between the solutions:

(i) comparing (b) and (c), any differences in M, differences in F, and differences in the GPA, and

(ii) comparing (c) and (d), any differences in M, differences in F, and differences in the GPA, and the connection with the Lagrange multiplier.