

## ECONOMICS

April 2001

**Question 1.** (20 points) This question is about the linear attributes model of K. L. Lancaster (1966). In this model purchasing goods provides no direct utility; instead, it is the attributes of goods that provide utility to individuals, and each specific good contains a fixed set of attributes. Suppose that Esther needs the calories ( $a_1$ ) and vitamins ( $a_2$ ) that various goods  $X$  and  $Y$  provide. Her utility is a function of these attributes, say

$$U(a_1, a_2) = \sqrt{a_1 a_2},$$

and Esther purchases goods  $X$  and  $Y$  only for the purpose of obtaining the calories and vitamins they offer. Assume that each unit of good  $X$  offers 1 unit of calories and 2 units of vitamins and that each unit of good  $Y$  offers 2 units of calories and 1 unit of vitamins. The prices of goods  $X$  and  $Y$  are \$1 and \$2, respectively. Esther has an income of \$10 and her decision problem is how to choose a diet that provides the optimal mix of calories and vitamins given the available food budget.

- (a) (5%) Write down Esther's optimization problem in mathematical terms.
- (b) (8%) Given her budget, how much should goods  $X$  and  $Y$  she buy? What is her utility level?
- (c) (7%) Suppose that Esther should have at least a utility  $\bar{U}$ . How much income does she need at least?

**Question 2.** (20 points) Read the article on the newspaper "USA TODAY" on January 4, 1999.

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USA TODAY, JANUARY 4, 1999

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### **Orange Prices Start to Rise after Calif. Freeze**

LOS ANGELES—Consumers will pay dramatically more for fresh oranges, the result of a killer freeze in California that has already doubled wholesale prices.

The coming price rise is the last in a string of calamities that struck agriculture in 1998.

California navel oranges "will be in very limited quantities," and "what is available will be higher in price," said Paul Bernish, spokesman for Kroger, the nation's largest supermarket chain.

"So far, at least, price increases for citrus products have not been passed along to consumers," Bernish said.

Food Lion, with 1,208 stores mostly in the Southeast, said store prices on fresh

oranges will rise 20% to 30% this week, less than the 100% increase it's paying at wholesale. "We're trying to absorb as much of that (the price increase) as we can," spokeswoman Chris Ahearn said.

California supplies about 80% of the nation's eating oranges and lemons. Four days of freezing temperatures in the Central Valley last month caused about \$530 million in damage. ...

For fresh oranges, the prices are already rising. A standard 37½-pound box of oranges is selling at wholesale for \$20 to \$24 depending on size and quality, double the price before the frost, the California Farm Bureau Federation reported. ...

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(背面仍有題目,請繼續作答)

The following two figures are the wholesale market and the retail market of orange in 1998 and 1999, respectively. In a wholesale market, orange growers sell their production to major supermarket chains and in a retail market, supermarket chains sell oranges to consumers. Answer the following questions and explain them by using a graph.

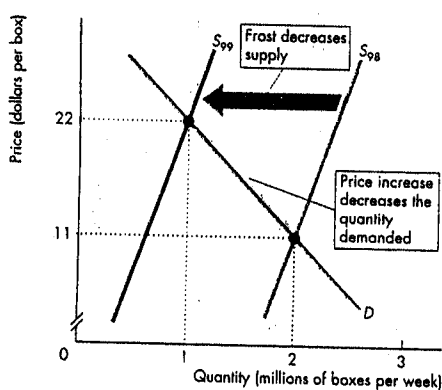


Figure 1 The wholesale market

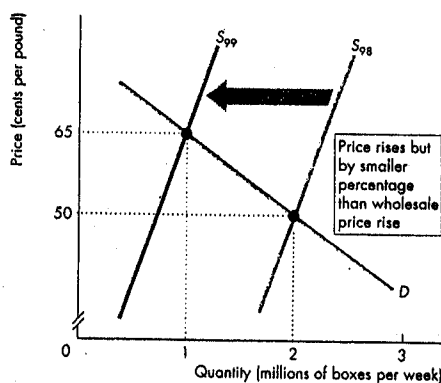


Figure 2 The retail market

- (5%) Why does the supply of oranges decrease but the demand for oranges not change? How can the demand not change when the quantity available decreases?
- (5%) The percentage rise in the wholesale price exceeded the percentage rise in the retail price because of the different demand elasticities of the two markets. Calculate their elasticities. Explain why the elasticity of the retail market is higher than that of the wholesale market.
- (5%) Explain to Chris Ahearn and Paul Bernish (the spokespeople for Food Lion and Kroger) why the retail price of oranges is out of their control. How would you explain the forces that determine the prices in both the wholesale market and the retail market?
- (5%) Gray Davis, the governor of California, wants your advice on what to do about the effects of the freeze on the orange market. In particular, he wants to know what can be done to keep the price of oranges down and the incomes of the orange growers up. Write a brief report to Mr. Davis outlining his options, if he has any, or explaining why there is nothing he can do, if that is your opinion.

**Question 3.** (25 points) An enterprising entrepreneur purchases two firms to produce widgets. Each firm produces identical products, and each has a production function given by

$$q = \sqrt{K_i L_i} \quad i = 1, 2.$$

The firms differ, however, in the amount of capital equipment each has. In particular, firm 1 has  $K_1 = 25$ , whereas firm 2 has  $K_2 = 100$ . Rental rates for  $K$  and  $L$  are given by  $w = v = \$1$ .

- (5%) If the entrepreneur wishes to minimize short-run total costs of widget production, how should output be allocated between the two firms?
- (10%) Given that output is optimally allocated between the two firms, calculate the short-run total, average, and marginal cost curves. What is the marginal cost of the 100th widget? The 125th widget? The 200th widget?
- (10%) How should the entrepreneur allocate widget production between the firms in the long run? Calculate the long-run total, average, and marginal cost curves for widget production.

**Question 4.** (35 points)

- (15%) Suppose that the GDP deflator is equal to 1 and that the nominal money stock is equal to \$1.5 trillion. If the demand schedule for real money balances is given by the straight-line function (measured in trillions of dollars),

$$M^d = 0.9Y - 80r,$$

what is the equation for the economy's  $LM$  schedule? Draw the two graphs showing how you derive the  $LM$  curve. If  $Y$  is equal to \$7 trillion, what is the equilibrium nominal interest rate?

- (15%) Suppose that desired investment spending is determined by the equation (measured in trillions of dollars),

$$I = 5.8 - 80r.$$

If government spending is equal to \$2 trillion, real consumption spending is equal to a fixed value of \$3 trillion, and net export spending is equal to \$1 trillion, what is the equation for the economy's  $IS$  schedule? Draw the two graphs showing how you derive the  $IS$  curve. If the nominal interest rate is 5 percent (that is, 0.05), what is the equilibrium level of real income?

- (5%) Calculate the single real income-nominal interest rate combination for an  $IS - LM$  equilibrium.