

Part I. Answer all statements in Part I. Tell whether each statement is true, false, or uncertain; then, briefly explain your answer.

1. According to the marginal productivity theory of income distribution, an increase in the wage rate will result in an increase in the share of income that goes to suppliers of capital.
2. If the demand curve for a good is described by  $Q = O P^{-1.2} I^3$  (where  $Q$  is quantity,  $P$  is own price,  $I$  is income, and  $O$  represents additional shift factors), then the price elasticity of demand will vary along the curve.
3. If there are two ice cream vendors deciding where to locate along a finite stretch of beach, then a decision by both vendors to locate in the center of the beach will be socially optimal in the sense of minimizing total travel cost for customers.
4. In the standard  $n$ -commodity consumer choice problem, if preferences are monotonic, then there must be at least one pair of commodities that are net substitutes.
5. Starting from a stable competitive equilibrium in the market for a Giffen good, the imposition of a per-unit tax on the good will cause the price of the good to decrease.
6. If a monopolist has increasing returns to scale instead of decreasing returns to scale, then an improvement in factor productivities will cause price to increase instead of decrease.
7. Assuming no change in technology, it is consistent with profit maximization for a producer to employ 30 units of labor and 30 units of capital when the respective factor prices are 10 and 5, and then to employ 15 units of labor and 40 units of capital when the factor prices are 5 and 10, respectively.
8. If firms in a perfectly competitive market have strictly convex production functions, then long-run equilibrium analysis implies that the number of firms would approach infinity, with each firm becoming near zero in size.
9. In a pure exchange model, if all preference sets are convex, then every competitive equilibrium is Pareto optimal; furthermore, every Pareto optimal distribution can be sustained as a competitive price equilibrium, given appropriate lump-sum redistributions by the government.

Part II. Please answer one of the following questions.

10. Suppose a household makes its labor supply decision in the following context:
- Household utility is given by  $U = CH$ , where  $C$  is weekly consumption and  $H$  is weekly hours of leisure.
  - The household's consumption budget constraint is described by
$$pC + w(168 - H) = A$$
where  $p$  is the per-unit price of consumption,  $w$  is the per-hour wage for labor, 168 is the weekly endowment of hours, and  $A$  is a fixed component of the budget.
  - The parameter  $A$  can be positive or negative. If it is positive, it represents some sort of weekly non-labor *income* (such as investment income) that increases disposable income. If it is negative it represents some kind of fixed weekly *payment* (such as a loan payment) that decreases disposable income.
- a. Mathematically derive this household's supply of labor,  $L$ , as a function of the relevant parameters.
  - b. Graphically present the labor supply curve(s), paying particular attention to the case of  $A > 0$  compared to the case of  $A < 0$ . And what if  $A = 0$ ?
  - c. Discuss the economic common sense of why the sign of  $A$  would affect labor supply the way it does in this model.
11. Consider a market with a price leader and a competitive fringe of firms. Suppose the market demand curve is given by  $Q^d = -2,000 P + 70,000$  and the supply curve of the competitive fringe is given by  $Q^s = 1000 P - 5,000$ .
- a. Suppose the price leader faces a constant  $MC = 15$ . Solve for the price leader's residual demand curve, the profit-maximizing output and price, and the quantity supplied by the competitive fringe.
  - b. Now suppose the price leader drives the competitive fringe out of business and monopolizes the market. What will be its profit-maximizing output and price? Comment on the comparison between your answers in parts a. and b.
  - c. Suppose instead that there are two firms in the market, that they face the market demand curve given above, and that they each have a constant  $MC = 15$ . If firm 1 is a Stackelberg leader, what will be the market price, and the quantities produced by firm 1 (the leader) and firm 2 (the follower)? Comment on the comparison between your answers in parts a. and c.
12. From a methodological perspective, explain how an analogy can be established between a firm's profit function and a consumer's indirect utility function, specifically using the function  $f(x_1, x_2) = x_1^{1/3} x_2^{1/2}$  for both the production function and the utility function in your discussion. Your answer should include discussions of homogeneity characteristics, the applicability of the

Envelope Theorem regarding the derivation of pertinent supply and demand functions, and producer surplus versus consumer surplus.

Part III. Please answer one of the following questions.

13. The Bush administration is considering adding a prescription drug benefit to the Federal medical insurance program for the elderly (Medicare). Give a microeconomic analysis of the likely effects of such a program on the welfare of households, particularly comparing the welfare of those who are eligible for the benefit with the welfare of those who are not.
  
14. General Electric (GE) produces airplane engines and Honeywell produces navigation equipment, communications equipment, landing gear, and other related products. Both GE's and Honeywell's products are complementary inputs for aircraft manufacturers such as Boeing.
  - a. Present the basic elements of a model that represents the situation described above, and describes the profits of GE, Honeywell, and Boeing, and the welfare of the ultimate consumers.
  
  - b. What should be a regulator's position on a proposed merger between GE and Honeywell, considering firm profits and consumer welfare? Is your answer affected by whether the firms have market power, compared to if they were highly competitive (such as in Cournot's famous example of zinc and copper being used as complementary inputs in the production of brass)?