Solutions Manual

for

Economics for Investment Decision Makers

Micro, Macro, and International Economics

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NOTE: This file includes solutions to the book's end-of-chapter problems (Part II).

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PART I

LEARNING OUTCOMES, SUMMARY OVERVIEW, AND PRACTICE PROBLEMS

CHAPTER 1

DEMAND AND SUPPLY ANALYSIS: INTRODUCTION

LEARNING OUTCOMES

After completing this chapter, you will be able to do the following:

- Distinguish among types of markets.
- Explain the principles of demand and supply.
- Describe causes of shifts in and movements along demand and supply curves.
- Describe the process of aggregating demand and supply curves, the concept of equilibrium, and mechanisms by which markets achieve equilibrium.
- Distinguish between stable and unstable equilibria and identify instances of such equilibria.
- Calculate and interpret individual and aggregate demand and inverse demand and supply functions, and interpret individual and aggregate demand and supply curves.
- Calculate and interpret the amount of excess demand or excess supply associated with a nonequilibrium price.
- Describe the types of auctions and calculate the winning price(s) of an auction.
- Calculate and interpret consumer surplus, producer surplus, and total surplus.
- Analyze the effects of government regulation and intervention on demand and supply.
- Forecast the effect of the introduction and the removal of a market interference (e.g., a price floor or ceiling) on price and quantity.
- Calculate and interpret price, income, and cross-price elasticities of demand, and describe factors that affect each measure.

SUMMARY OVERVIEW

- The basic model of markets is the demand and supply model. The demand function represents buyers' behavior and can be depicted (in its inverse demand form) as a negatively sloped demand curve. The supply function represents sellers' behavior and can be depicted (in its inverse supply form) as a positively sloped supply curve. The interaction of buyers and sellers in a market results in equilibrium. Equilibrium exists when the highest price willingly paid by buyers is just equal to the lowest price willingly accepted by sellers.

- Goods markets are the interactions of consumers as buyers and firms as sellers of goods and services produced by firms and bought by households. Factor markets are the interactions of firms as buyers and households as sellers of land, labor, capital, and entrepreneurial risk-taking ability. Capital markets are used by firms to sell debt or equity to raise long-term capital to finance the production of goods and services.
- Demand and supply curves are drawn on the assumption that everything *except* the price of the good itself is held constant (an assumption known as ceteris paribus or "holding all other things constant"). When something other than price changes, the demand curve or the supply curve will shift relative to the other curve. This shift is referred to as a change in demand or supply, as opposed to quantity demanded or quantity supplied. A new equilibrium generally will be obtained at a different price and a different quantity than before. The market mechanism is the ability of prices to adjust to eliminate any excess demand or supply resulting from a shift in one or the other curve.
- If, at a given price, the quantity demanded exceeds the quantity supplied, there is excess demand and the price will rise. If, at a given price, the quantity supplied exceeds the quantity demanded, there is excess supply and the price will fall.
- Sometimes auctions are used to seek equilibrium prices. Common value auctions sell items that have the same value to all bidders, but bidders can only estimate that value before the auction is completed. Overly optimistic bidders overestimate the true value and end up paying a price greater than that value. This result is known as the winner's curse. Private value auctions sell items that (generally) have a unique subjective value for each bidder. Ascending price auctions use an auctioneer to call out ever-increasing prices until the last, highest bidder ultimately pays his or her bid price and buys the item. Descending price, or Dutch, auctions begin at a very high price and then reduce that price until one bidder is willing to buy at that price. Second price sealed-bid auctions are sometimes used to induce bidders to reveal their true reservation prices in private value auctions. Treasury notes and some other financial instruments are sold using a form of Dutch auction (called a single price auction) in which competitive and noncompetitive bids are arrayed in descending price (increasing yield) order. The winning bidders all pay the same price, but marginal bidders might not be able to fill their entire order at the market-clearing price.
- Markets that work freely can optimize society's welfare, as measured by consumer surplus and producer surplus. Consumer surplus is the difference between the total value to buyers and the total expenditure necessary to purchase a given amount. Producer surplus is the difference between the total revenue received by sellers from selling a given amount and the total variable cost of production of that amount. When equilibrium price is reached, total surplus is maximized.
- Sometimes, government policies interfere with the free working of markets. Examples include price ceilings, price floors, and specific taxes. Whenever the imposition of such a policy alters the free market equilibrium quantity (the quantity that maximizes total surplus), there is a redistribution of surplus between buyers and sellers; but there is also a reduction of total surplus, called deadweight loss. Other influences can result in an imbalance between demand and supply. Search costs are impediments in the ability of willing buyers and willing sellers to meet in a transaction. Brokers can add value if they reduce search costs and match buyers and sellers. In general, anything that improves information about the willingness of buyers and sellers to engage will reduce search costs and add value.
- Economists use a quantitative measure of sensitivity called elasticity. In general, elasticity is the ratio of the percentage change in the dependent variable to the percentage change in the

independent variable of interest. Important specific elasticities include own-price elasticity of demand, income elasticity of demand, and cross-price elasticity of demand.

- Based on algebraic sign and magnitude of the various elasticities, goods can be classified into groups. If own-price elasticity of demand is less than 1 in absolute value, demand is called "inelastic"; it is called "elastic" if own-price elasticity of demand is greater than 1 in absolute value. Goods with positive income elasticity of demand are called normal goods, and those with negative income elasticity of demand are called inferior goods. Two goods with negative cross-price elasticity of demand—a drop in the price of one good causes an increase in demand for the other good—are called complements. Goods with positive cross-price elasticity of demand—a drop in the price of one good causes a decrease in demand for the other—are called substitutes.
- The relationship among own-price elasticity of demand, changes in price, and changes in total expenditure is as follows: If demand is elastic, a reduction in price results in an increase in total expenditure; if demand is inelastic, a reduction in price results in a decrease in total expenditure; if demand is unitary elastic, a change in price leaves total expenditure unchanged.

PRACTICE PROBLEMS[1]

1. Which of the following markets is *most* accurately characterized as a goods market? The market for:
   A. coats.
   B. sales clerks.
   C. cotton farmland.

2. The observation "As a price of a good falls, buyers buy more of it" is *best* known as:
   A. consumer surplus.
   B. the law of demand.
   C. the market mechanism.

3. Two-dimensional demand and supply curves are drawn under which of the following assumptions?
   A. Own price is held constant.
   B. All variables but quantity are held constant.
   C. All variables but own price and quantity are held constant.

4. The slope of a supply curve is *most* often:
   A. zero.
   B. positive.
   C. negative.

5. Assume the following equation:

$$Q_x^s = -4 + \tfrac{1}{2}P_x - 2W$$

[1]These practice problems were written by William Akmentins, CFA (Dallas, Texas, USA).

where Q_x^s is the quantity of good X supplied, P_x is the price of good X, and W is the wage rate paid to laborers. If the wage rate is 11, the vertical intercept on a graph depicting the supply curve is *closest* to:
A. -26.
B. -4.
C. 52.

6. Movement along the demand curve for good X occurs due to a change in:
A. income.
B. the price of good X.
C. the price of a substitute for good X.

The following information relates to Questions 7 through 9.

A producer's supply function is given by the equation:

$$Q_s^s = -55 + 26P_s + 1.3P_a$$

where Q_s^s is the quantity of steel supplied by the market, P_s is the per-unit price of steel, and P_a is the per-unit price of aluminum.

7. If the price of aluminum rises, what happens to the steel producer's supply curve? The supply curve:
A. shifts to the left.
B. shifts to the right.
C. remains unchanged.

8. If the unit price of aluminum is 10, the slope of the supply curve is *closest* to:
A. 0.04.
B. 1.30.
C. 26.00.

9. Assume the supply side of the market consists of exactly five identical sellers. If the unit price of aluminum is 20, which equation is *closest* to the expression for the market inverse supply function?
A. $P_s = 9.6 + 0.04Q_s^s$
B. $P_s = 1.1 + 0.008Q_s^s$
C. $Q_s^s = -145 + 130P_s$

10. Which of the following statements about market equilibrium is *most* accurate?
A. The difference between quantity demanded and quantity supplied is zero.
B. The demand curve is negatively sloped and the supply curve is positively sloped.
C. For any given pair of market demand and supply curves, only one equilibrium point can exist.

11. Which of the following statements *best* characterizes the market mechanism for attaining equilibrium?
    A. Excess supply causes prices to fall.
    B. Excess demand causes prices to fall.
    C. The demand and supply curves shift to reach equilibrium.

12. An auction in which the auctioneer starts at a high price and then lowers the price in increments until there is a willing buyer is *best* called a:
    A. Dutch auction.
    B. Vickery auction.
    C. private value auction.

13. Which statement is *most likely* to be true in a single price U.S. Treasury bill auction?
    A. Only some noncompetitive bids would be filled.
    B. Bidders at the highest winning yield may get only a portion of their orders filled.
    C. All bidders at a yield higher than the winning bid would get their entire orders filled.

14. The winner's curse in common value auctions is *best* described as the winning bidder paying:
    A. more than the value of the asset.
    B. a price not equal to one's own bid.
    C. more than intended prior to bidding.

15. A wireless phone manufacturer introduced a next-generation phone that received a high level of positive publicity. Despite running several high-speed production assembly lines, the manufacturer is still falling short in meeting demand for the phone nine months after introduction. Which of the following statements is the *most* plausible explanation for the demand/supply imbalance?
    A. The phone price is low relative to the equilibrium price.
    B. Competitors introduced next-generation phones at a similar price.
    C. Consumer incomes grew faster than the manufacturer anticipated.

16. A per-unit tax on items sold that is paid by the seller will *most likely* result in the:
    A. supply curve shifting vertically upward.
    B. demand curve shifting vertically upward.
    C. demand curve shifting vertically downward.

17. Which of the following *most* accurately and completely describes a deadweight loss?
    A. A transfer of surplus from one party to another
    B. A reduction in either the buyer's or the seller's surplus
    C. A reduction in total surplus resulting from market interference

18. If an excise tax is paid by the buyer instead of the seller, which of the following statements is *most likely* to be true?
    A. The price paid will be higher than if the seller had paid the tax.
    B. The price received will be lower than if the seller had paid the tax.
    C. The price received will be the same as if the seller had paid the tax.

19. A quota on an imported good below the market-clearing quantity will *most likely* lead to which of the following effects?
    A. The supply curve shifts upward.
    B. The demand curve shifts upward.
    C. Some of the buyer's surplus transfers to the seller.

20. Assume a market demand function is given by the equation:

$$Q^d = 50 - 0.75P$$

    where Q^d is the quantity demanded and P is the price. If P equals 10, the value of the consumer surplus is *closest* to:
    A. 67.
    B. 1,205.
    C. 1,667.

21. Which of the following *best* describes producer surplus?
    A. Revenue minus variable costs
    B. Revenue minus variable plus fixed costs
    C. The area above the supply curve and beneath the demand curve and to the left of the equilibrium point

22. Assume a market supply function is given by the equation

$$Q_s = -7 + 0.6P$$

    where Q_s is the quantity supplied and P is the price. If P equals 15, the value of the producer surplus is *closest* to:
    A. 3.3.
    B. 41.0.
    C. 67.5.

The following information relates to Questions 23 through 25.

The market demand function for four-year private universities is given by the equation:

$$Q_{pr}^d = 84 - 3.1P_{pr} + 0.8I + 0.9P_{pu}$$

where Q_{pr}^d is the number of applicants to private universities per year in thousands, P_{pr} is the average price of private universities (in thousands of USD), I is the household monthly income (in thousands of USD), and P_{pu} is the average price of public (government-supported) universities (in thousands of USD). Assume that P_{pr} is equal to 38, I is equal to 100, and P_{pu} is equal to 18.

23. The price elasticity of demand for private universities is *closest* to:
    A. −3.1.
    B. −1.9.
    C. 0.6.

24. The income elasticity of demand for private universities is *closest* to:
    A. 0.5.
    B. 0.8.
    C. 1.3.

25. The cross-price elasticity of demand for private universities with respect to the average price of public universities is *closest* to:
    A. 0.3.
    B. 3.1.
    C. 3.9.

26. If the cross-price elasticity between two goods is negative, the two goods are classified as:
    A. normal.
    B. substitutes.
    C. complements.

CHAPTER 2

DEMAND AND SUPPLY ANALYSIS: CONSUMER DEMAND

LEARNING OUTCOMES

After completing this chapter, you will be able to do the following:

- Describe consumer choice theory and utility theory.
- Describe the use of indifference curves, opportunity sets, and budget constraints in decision making.
- Calculate and interpret a budget constraint.
- Determine a consumer's equilibrium bundle of goods based on utility analysis.
- Compare substitution and income effects.
- Distinguish between normal goods and inferior goods, and explain Giffen goods and Veblen goods in this context.

SUMMARY OVERVIEW

- Consumer choice theory is the branch of microeconomics that relates consumer demand curves to consumer preferences. Utility theory is a quantitative model of consumer preferences and is based on a set of axioms (assumptions that are assumed to be true). If consumer preferences are complete, transitive, and insatiable, those preferences can be represented by an ordinal utility function and depicted by a set of indifference curves that are generally negatively sloped, are convex from below, and do not cross for a given consumer.
- A consumer's relative strength of preferences can be inferred from his marginal rate of substitution of good X for good Y (MRS_{XY}), which is the rate at which the consumer is willing to sacrifice good Y to obtain an additional small increment of good X. If two consumers have different marginal rates of substitution, they can both benefit from the voluntary exchange of one good for the other.
- A consumer's attainable consumption options are determined by her income and the prices of the goods she must purchase to consume. The set of options available is bounded by the budget constraint, a negatively sloped linear relationship that shows the highest quantity of one good that can be purchased for any given amount of the other good being bought.

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- Analogous to the consumer's consumption opportunity set are, respectively, the production opportunity set and the investment opportunity set. A company's production opportunity set represents the greatest quantity of one product that a company can produce for any given amount of the other good it produces. The investment opportunity set represents the highest return an investor can expect for any given amount of risk undertaken.
- Consumer equilibrium is obtained when utility is maximized, subject to the budget constraint, generally depicted as a tangency between the highest attainable indifference curve and the fixed budget constraint. At that tangency, the MRS_{XY} is just equal to the two goods' price ratio, P_X/P_Y—or that bundle such that the rate at which the consumer is just willing to sacrifice good Y for good X is equal to the rate at which, based on prices, she must sacrifice good Y for good X.
- If the consumer's income and the price of all other goods are held constant and the price of good X is varied, the set of consumer equilibria that results will yield that consumer's demand curve for good X. In general, we expect the demand curve to have a negative slope (the law of demand) because of two influences: income and substitution effects of a decrease in price. Normal goods have a negatively sloped demand curve. For normal goods, income and substitution effects reinforce one another. However, for inferior goods, the income effect offsets part or all of the substitution effect. In the case of the Giffen good, the income effect of this very inferior good overwhelms the substitution effect, resulting in a positively sloped demand curve.
- In accepted microeconomic consumer theory, the consumer is assumed to be able to judge the value of any given bundle of goods without knowing anything about their prices. Then, constrained by income and prices, the consumer is assumed to be able to choose the optimal bundle of goods that is in the set of available options. It is possible to conceive of a situation in which the consumer cannot truly value a good until the price is known. In these Veblen goods, the price is used by the consumer to signal the consumer's status in society. Thus, to some extent, the higher the price of the good, the more value it offers to the consumer. In the extreme case, this could possibly result in a positively sloped demand curve. This result is similar to a Giffen good, but the two goods are fundamentally different.

PRACTICE PROBLEMS[1]

1. A child indicates that she prefers going to the zoo over the park and prefers going to the beach over the zoo. When given the choice between the park and the beach, she chooses the park. Which of the following assumptions of consumer preference theory is she *most likely* violating?
   A. Nonsatiation
   B. Complete preferences
   C. Transitive preferences

2. Which of the following ranking systems *best* describes consumer preferences within a utility function?
   A. Util
   B. Ordinal
   C. Cardinal

[1]These practice problems were written by William Akmentins, CFA (Dallas, Texas, USA).

3. Which of the following statements *best* explains why indifference curves are generally convex as viewed from the origin?
   A. The assumption of nonsatiation results in convex indifference curves.
   B. The marginal rate of substitution of one good for another remains constant along an indifference curve.
   C. The marginal utility gained from one additional unit of a good versus another diminishes the more one has of the first good.

4. If a consumer's marginal rate of substitution of good X for good Y (MRS_{XY}) is equal to 2, then the:
   A. consumer is willing to give up two units of X for one unit of Y.
   B. slope of a line tangent to the indifference curve at that point is 2.
   C. slope of a line tangent to the indifference curve at that point is -2.

5. In the case of two goods, x and y, which of the following statements is *most likely* true? Maximum utility is achieved:
   A. along the highest indifference curve below the budget constraint line.
   B. at the tangency between the highest attainable indifference curve and the budget constraint line.
   C. when the marginal rate of substitution is equal to the ratio of the price of good y to the price of good x.

6. In the case of a normal good with a decrease in its own price, which of the following statements is *most likely* true?
   A. Both the substitution effect and the income effect lead to an increase in the quantity purchased.
   B. The substitution effect leads to an increase in the quantity purchased, while the income effect has no impact.
   C. The substitution effect leads to an increase in the quantity purchased, while the income effect leads to a decrease.

7. For a Giffen good, the:
   A. demand curve is positively sloped.
   B. substitution effect overwhelms the income effect.
   C. income and substitution effects are in the same direction.

8. Which of the following statements *best* illustrates the difference between a Giffen good and a Veblen good?
   A. The Giffen good alone is an inferior good.
   B. Their substitution effects are in opposite directions.
   C. The Veblen good alone has a positively sloped demand curve.

CHAPTER 3

DEMAND AND SUPPLY ANALYSIS: THE FIRM

LEARNING OUTCOMES

After completing this chapter, you will be able to do the following:

- Calculate, interpret, and compare accounting profit, economic profit, normal profit, and economic rent.
- Calculate, interpret, and compare total, average, and marginal revenue.
- Describe the firm's factors of production.
- Calculate and interpret total, average, marginal, fixed, and variable costs.
- Determine and describe breakeven and shutdown points of production.
- Explain how economies of scale and diseconomies of scale affect costs.
- Describe approaches to determining the profit-maximizing level of output.
- Distinguish between short-run and long-run profit maximization.
- Distinguish among decreasing-cost, constant-cost, and increasing-cost industries and describe the long-run supply of each.
- Calculate and interpret total, marginal, and average product of labor.
- Describe the phenomenon of diminishing marginal returns, and calculate and interpret the profit-maximizing utilization level of an input.
- Determine the optimal combination of resources that minimizes cost.

SUMMARY OVERVIEW

- The two major concepts of profits are accounting profit and economic profit. Economic profit equals accounting profit minus implicit opportunity costs not included in accounting costs. Profit in the theory of the firm refers to economic profit.
- Normal profit is an economic profit of zero. A firm earning a normal profit is earning just enough to cover the explicit and implicit costs of resources used in running the firm, including, most importantly for publicly traded corporations, debt and equity capital.
- Economic profit is a residual value in excess of normal profit and results from access to positive NPV investment opportunities.
- The factors of production are the inputs to the production of goods and services and include land, labor, capital, and materials.

- Profit maximization occurs at the following points:
  - Where the difference between total revenue and total costs is the greatest.
  - Where marginal revenue equals marginal cost.
  - Where marginal revenue product equals the resource cost for each type of input.
- When total costs exceed total revenue, loss minimization occurs where the difference between total costs and total revenue is the least.
- In the long run, all inputs to the firm are variable, which expands profit potential and the number of cost structures available to the firm.
- Under perfect competition, long-run profit maximization occurs at the minimum point of the firm's long-run average total cost curve.
- In an economic loss situation, a firm can operate in the short run if total revenue covers variable cost but is inadequate to cover fixed cost; however, in the long run, the firm will exit the market if fixed costs are not covered in full.
- In an economic loss situation, a firm shuts down in the short run if total revenue does not cover variable cost in full, and eventually exits the market if the shortfall is not reversed.
- Economies of scale lead to lower average total cost; diseconomies of scale lead to higher average total cost.
- A firm's production function defines the relationship between total product and inputs.
- Average product and marginal product, which are derived from total product, are key measures of a firm's productivity.
- Increases in productivity reduce business costs and enhance profitability.
- An industry supply curve that is positively sloped in the long run will increase production costs to the firm. An industry supply curve that is negatively sloped in the long run will decrease production costs to the firm.
- In the short run, assuming constant resource prices, increasing marginal returns reduce the marginal costs of production, and decreasing marginal returns increase the marginal costs of production.

PRACTICE PROBLEMS[1]

1. Normal profit is *best* described as:
   A. zero economic profit.
   B. total revenue minus all explicit costs.
   C. the sum of accounting profit plus economic profit.

2. A firm supplying a commodity product in the marketplace is *most likely* to receive economic rent if:
   A. demand increases for the commodity and supply is elastic.
   B. demand increases for the commodity and supply is inelastic.
   C. supply increases for the commodity and demand is inelastic.

3. Entrepreneurs are *most likely* to receive payment or compensation in the form of:
   A. rent.
   B. profit.
   C. wages.

[1]These practice problems were developed by Christopher Anderson, CFA (Lawrence, Kansas, USA).

4. The marketing director for a Swiss specialty equipment manufacturer estimates the firm can sell 200 units and earn total revenue of CHF500,000. However, if 250 units are sold, revenue will total CHF600,000. The marginal revenue per unit associated with marketing 250 units instead of 200 units is *closest* to:
   A. CHF2,000.
   B. CHF2,400.
   C. CHF2,500.

5. An agricultural firm operating in a perfectly competitive market supplies wheat to manufacturers of consumer food products and animal feeds. If the firm were able to expand its production and unit sales by 10 percent, the *most likely* result would be:
   A. a 10 percent increase in total revenue.
   B. a 10 percent increase in average revenue.
   C. an increase in total revenue of less than 10 percent.

6. An operator of a ski resort is considering offering price reductions on weekday ski passes. At the normal price of €50 per day, 300 customers are expected to buy passes each weekday. At a discounted price of €40 per day, 450 customers are expected to buy passes each weekday. The marginal revenue per customer earned from offering the discounted price is *closest* to:
   A. €20.
   B. €40.
   C. €50.

7. The marginal revenue per unit sold for a firm doing business under conditions of perfect competition will *most likely* be:
   A. equal to average revenue.
   B. less than average revenue.
   C. greater than average revenue.

The following information relates to Questions 8 through 10.

A firm's director of operations gathers the following information about the firm's cost structure at different levels of output:

Exhibit A

Quantity (*Q*)	Total Fixed Cost (*TFC*)	Total Variable Cost (*TVC*)
0	200	0
1	200	100
2	200	150
3	200	200
4	200	240
5	200	320

8. Refer to the data in Exhibit A. When quantity produced is equal to four units, the average fixed cost (*AFC*) is *closest* to:
   A. 50.
   B. 60.
   C. 110.

9. Refer to the data in Exhibit A. When the firm increases production from four to five units, the marginal cost (*MC*) is *closest* to:
   A. 40.
   B. 64.
   C. 80.

10. Refer to the data in Exhibit A. The level of unit production resulting in the lowest average total cost (*ATC*) is *closest* to:
   A. 3.
   B. 4.
   C. 5.

11. The short-term breakeven point of production for a firm operating under perfect competition will *most likely* occur when:
   A. price is equal to average total cost.
   B. marginal revenue is equal to marginal cost.
   C. marginal revenue is equal to average variable costs.

12. The short-term shutdown point of production for a firm operating under perfect competition will *most likely* occur when:
   A. price is equal to average total cost.
   B. marginal revenue is equal to marginal cost.
   C. marginal revenue is less than average variable costs.

13. When total revenue is greater than total variable costs but less than total costs, in the short term a firm will *most likely*:
   A. exit the market.
   B. stay in the market.
   C. shut down production.

14. A profit maximum is *least likely* to occur when:
   A. average total cost is minimized.
   B. marginal revenue equals marginal cost.
   C. the difference between total revenue and total cost is maximized.

15. A firm that increases its quantity produced without any change in per-unit cost is experiencing:
   A. economies of scale.
   B. diseconomies of scale.
   C. constant returns to scale.

16. A firm is operating beyond minimum efficient scale in a perfectly competitive industry. To maintain long-term viability, the *most likely* course of action for the firm is to:
    A. operate at the current level of production.
    B. increase its level of production to gain economies of scale.
    C. decrease its level of production to the minimum point on the long-run average total cost curve.

17. Under conditions of perfect competition, in the long run firms will *most likely* earn:
    A. normal profits.
    B. positive economic profits.
    C. negative economic profits.

18. A firm engages in the development and extraction of oil and gas, the supply of which is price inelastic. The *most likely* equilibrium response in the long run to an increase in the demand for petroleum is that oil prices:
    A. increase, and extraction costs per barrel fall.
    B. increase, and extraction costs per barrel rise.
    C. remain constant, and extraction costs per barrel remain constant.

19. A firm develops and markets consumer electronic devices in a perfectly competitive, decreasing-cost industry. The firm's products have grown in popularity. The *most likely* equilibrium response in the long run to rising demand for such devices is for selling prices to:
    A. fall and per-unit production costs to decrease.
    B. rise and per-unit production costs to decrease.
    C. remain constant and per-unit production costs to remain constant.

The following information relates to Questions 20 and 21.

The manager of a small manufacturing firm gathers the following information about the firm's labor utilization and production:

Exhibit B

Labor (*L*)	Total Product (*TP*)
0	0
1	150
2	320
3	510
4	660
5	800

20. Refer to the data in Exhibit B. The number of workers resulting in the highest level of average product of labor is *closest* to:
    A. 3.
    B. 4.
    C. 5.

21. Refer to the data in Exhibit B. The marginal product of labor demonstrates increasing returns for the firm if the number of workers is *closest* to but not more than:
    A. 2.
    B. 3.
    C. 4.

22. A firm experiencing an increase in the marginal product of labor employed would *most likely*:
    A. allow an increased number of workers to specialize and become more adept at their individual functions.
    B. find that an increase in workers cannot be efficiently matched by other inputs that are fixed, such as property, plant, and equipment.
    C. find that the supply of skilled workers is limited, and additional workers lack essential skills and aptitudes possessed by the current workforce.

23. For a manufacturing company to achieve the most efficient combination of labor and capital and therefore to minimize total costs for a desired level of output, it will *most likely* attempt to equalize the:
    A. average product of labor to the average product of capital.
    B. marginal product per unit of labor to the marginal product per unit of capital.
    C. marginal product obtained per dollar spent on labor to the marginal product per dollar spent on capital.

24. A firm will expand production by 200 units and must hire at least one additional worker. The marginal product per day for one additional unskilled worker is 100 units, and for one additional skilled worker it is 200 units. Wages per day are $200 for an unskilled worker and $450 for a skilled worker. The firm will *most likely* minimize costs at the higher level of production by hiring:
    A. one additional skilled worker.
    B. two additional unskilled workers.
    C. either a skilled worker or two unskilled workers.

25. A Mexican firm employs unskilled, semiskilled, and skilled labor in a cost-minimizing mix at its manufacturing plant. The marginal product of unskilled labor is considerably lower than semiskilled and skilled labor, but the equilibrium wage for unskilled labor is only 300 pesos per day. The government passes a law that mandates a minimum wage of 400 pesos per day. Equilibrium wages for semiskilled and skilled labor exceed this minimum wage and therefore are not affected by the new law. The firm will *most likely* respond to the imposition of the minimum wage law by:
    A. employing more unskilled workers at its plant.
    B. employing fewer unskilled workers at its plant.
    C. keeping the mix of unskilled, semiskilled, and skilled workers the same.

The following information relates to Questions 26 and 27.

A firm produces handcrafted wooden chairs, employing both skilled craftspersons and automated equipment in its plant. The selling price of a chair is €100. A craftsperson earns €900 per week and can produce 10 chairs per week. Automated equipment leased for €800 per week also can produce 10 chairs per week.

26. The marginal revenue product (per week) of hiring an additional craftsperson is *closest* to:
    A. €100.
    B. €900.
    C. €1,000.

27. The firm would like to increase weekly output by 50 chairs. The firm would *most likely* enhance profits by:
    A. hiring additional craftspersons.
    B. leasing additional automated equipment.
    C. leasing additional automated equipment and hiring additional craftspersons in equal proportion.