1. What are the major features of monopolistic competition compared to perfect competition and monopoly?
   Ans: In monopolistic competition, there are a relatively large number of firms, but not as many as in a perfectly competitive market. The monopolistically competitive firms produce differentiated products, not the standardized products of perfect competition. Product differentiation means that monopolistic competitors engage in some price competition because they have some limited "price making" ability based on the less elastic demand for their particular product. This demand, however, is more elastic than the demand for monopolists' products. Monopolistic competitors, unlike most monopolists and all perfectly competitive firms, will engage in non-price competition that gets reflected in product quality, services, location, advertising, and packaging. Compared with monopoly, the barriers to entry for monopolistically competitive firms are minor. The firms typically are small in size, operate independently, and do not practice collusion.

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   Learning Objective: 9.1

2. "Perfect competition or monopoly industries will tend to be one-price industries. Monopolistic competition, however, is a multiprice industry." Explain.
   Ans: Monopolistic competition has the fundamental feature of product differentiation. This gives each firm a slight degree of monopolistic control over price. Consumers have preferences for the products or services of specific sellers and within limits will pay a higher price to satisfy those preferences.

   In perfect competition the demand curve facing each individual seller is perfectly elastic because all products are standardized. The seller and buyer must accept the market price in buying and selling. At the opposite extreme, a monopoly is the only seller and so is able to set the price.

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   Learning Objective: 9.1

3. How does economic rivalry take place in monopolistic competition? Describe the different aspects of product differentiation and price competition.
   Ans: Non-price competition is the typical type of economic rivalry that occurs in monopolistic competition. There are several forms of non-price competition. First, firms may compete by offering consumers different product features or by providing products of varying quality. Second, firms differ in the amount of service or support they provide the consumer. Third, in some monopolistically competitive industries such as restaurants or personal services, location becomes a critical factor on which firms compete. Fourth, advertising and packaging build loyalty to a particular brand or make one product more appealing to the consumer. Although monopolistic competitors have some degree of control over price, the non-price competition can be of even greater importance in influencing or meeting consumer tastes and preferences.

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   Learning Objective: 9.1

4. What are types of firms that exemplify monopolistic competition?
   Ans: Monopolistically competitive industries include small-scale manufacturing (clothing, machine shops, etc.), retailing in metropolitan areas (gas stations, restaurants, etc.), and professional services (legal assistance, real estate, etc.).

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5. How are monopolistically competitive industries identified with concentration ratios?
   Ans: The percentage of output produced by firms (often measured by sales) in an industry would be an empirical measure that could be used to judge whether an industry is monopolistically competitive. If the top four firms account for less than a quarter of industry output, then it would be a low-concentrated industry. Relatively low Herfindahl index values indicate a moderately large number of firms in an industry. These data would indicate that there are many producers in the industry, each only producing a small percentage of the total output typical of monopolistic competition.

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6. Assume that the short-run cost and demand data given in the table below confront a monopolistic competitor selling a given product and engaged in a given amount of product promotion. Compute the marginal cost and marginal revenue of each unit of output and enter these figures in the table.

Output	Total Cost	Marginal Cost	Quantity demanded	Price	Marginal revenue
0	$25		0	$60	
1	40	$_____	1	55	$_____
2	45	_____	2	50	_____
3	55	_____	3	45	_____
4	70	_____	4	40	_____
5	90	_____	5	35	_____
6	115	_____	6	30	_____
7	145	_____	7	25	_____
8	180	_____	8	20	_____
9	220	_____	9	15	_____
10	265	_____	10	10	_____

(a) At what output level and at what price will the firm produce in the short run? What will be the total profit?

(b) What will happen to demand, price, and profit in the long run?

Ans:

Output	Total cost	Marginal cost	Quantity demanded	Price	Marginal revenue
0	$25		0	$60	
1	40	$15	1	55	$ 55
2	45	5	2	50	45
3	55	10	3	45	35
4	70	15	4	40	25
5	90	20	5	35	15
6	115	25	6	30	5
7	145	30	7	25	–5
8	180	35	8	20	–15
9	220	40	9	15	–25
10	265	45	10	10	–35

(a) The firm will produce 4 units of output. At that level, marginal revenue ($25) is greater than marginal cost ($15), but as close to equality as possible. Total profit will be $90 [$160 – $70].

(b) The demand for the firm's product will decrease until price equals average cost and total profits are zero.

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7. Assume that the short-run cost and demand data given in the table below confront a monopolistic competitor selling a given product and engaged in a given amount of product promotion. Compute the marginal cost and marginal revenue of each unit of output and enter these figures in the table.

Output	Total Cost	Marginal Cost	Quantity demanded	Price	Marginal revenue
0	$75		0	$180	
1	120	$_____	1	165	$_____
2	135	_____	2	150	_____
3	165	_____	3	135	_____
4	210	_____	4	120	_____
5	270	_____	5	105	_____
6	345	_____	6	90	_____
7	435	_____	7	75	_____
8	540	_____	8	60	_____
9	660	_____	9	45	_____
10	795	_____	10	30	_____

(a) At what output level and at what price will the firm produce in the short run? What will be the total profit?

(b) What will happen to demand, price, and profit in the long run?

Ans:

Output	Total cost	Marginal cost	Quantity demanded	Price	Marginal revenue
0	$ 75		0	$180	
1	120	$45	1	165	$165
2	135	15	2	150	135
3	165	30	3	135	105
4	210	45	4	120	75
5	270	60	5	105	45
6	345	75	6	90	15
7	435	90	7	75	– 15
8	540	105	8	60	– 45
9	660	120	9	45	– 75
10	795	135	10	30	–105

(a) The firm will produce 4 units of output. At that level, marginal revenue ($75) is greater than marginal cost ($45), but as close to equality as possible. Total profit will be $270 [$480–$210].

(b) The demand for the firm's product will decrease until price equals average cost and total profits are zero.

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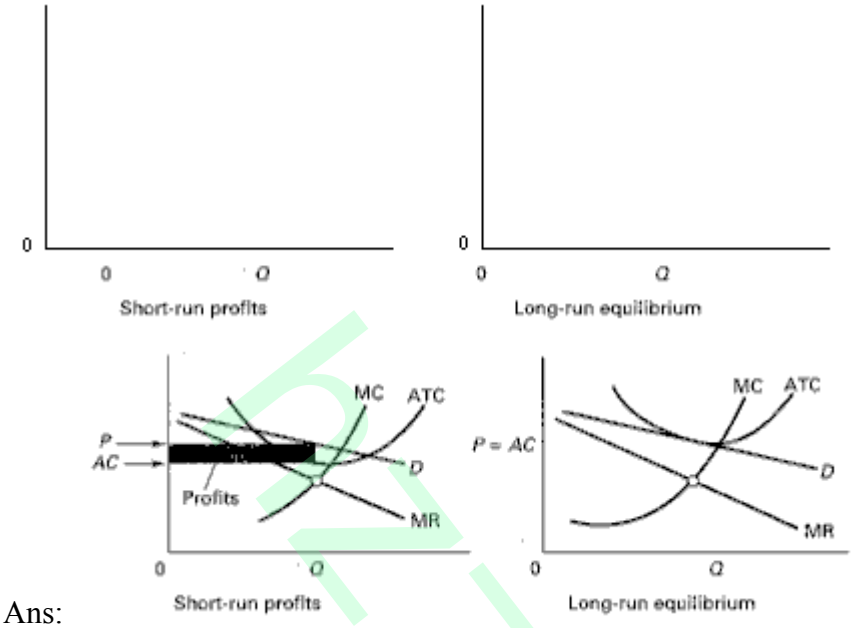
8. In the first graph below, illustrate the cost curves and demand conditions for a monopolistically competitive firm making short-run profits. In the second graph, illustrate what those conditions are most likely to be in the long run. Explain the major differences in the two graphs.



Ans:

In the short run, the firm can earn economic profits. In the long run, the potential for economic profits will be reduced as other firms enter the industry or compete more intensively with product differentiation and development. Only a normal profit is likely to be earned in the long run. Price will also be greater than the minimum of average cost.

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9. A monopolistically competitive firm is producing 50 units of output in the short run where marginal cost is $3.00, average total costs are $5.00, price is $4.50, average variable cost is $4.00, and marginal revenue is $3.00. How much profit is the firm making? What output recommendation would you make for the firm?
   Ans: The firm should not change the level of output because it is maximizing profits at the output level of 50 where the marginal cost of $3.00 is equal to the marginal revenue of $3.00. At that output, however, the firm is incurring $0.50 economic losses per unit ($4.50 price minus $5.00 average total cost) for a total economic loss of $25 ($0.50 times 50 units). The firm cannot operate under these conditions in the long run and will go bankrupt so it should eventually exit the industry.

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10. In the short run, a monopolistically competitive firm calculates that marginal cost is $6.00, average total costs are $4.00, and marginal revenue is $3.00. The firm is charging a price of $6.00 and producing 200 units of output. How much profit is the firm making? What output recommendation would you make as the company economist?
    Ans: The firm is not maximizing profits because the marginal cost of $6.00 is greater than marginal revenues of $3.00. The firm should cut back its production to an output level where marginal cost equals marginal revenue. At the current output level of 200 units, the firm is making economic profits per unit of $2.00 ($6.00 price minus $4.00 ATC) for a total profit of $400. But setting output at where MR = MC, the firm will reduce output, increase price, *and* increase economic profits.

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11. If monopolistically competitive firms have some control over their prices, why don't they set price above average total cost so they will realize an economic profit in the long run?
    Ans: Economic profits might persist in a few cases where product differentiation is very strong, or because some firm has some sort of permanent advantage such as location or especially effective advertising.

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    Learning Objective: 9.2

12. What are two real-world complications with the long-run conclusion about the representative firm in the model of monopolistic competition?
    Ans: In the long run, the representative firm in monopolistic competition should break even and earn only a normal profit. This conclusion, however, may not be true for all firms in the real world. First, economic profit may accrue in the long run because there may be some degree of monopoly power that is long term. Some firms may earn some economic profits even in the long run if the firm has a product or service that is not easy to duplicate or it has an extremely good location. Second, product differentiation creates a financial barrier to entry that may not be easy to overcome.

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13. "In monopolistically competitive markets neither allocative nor productive efficiency is realized." Explain.
    Ans: Price will exceed marginal cost because each firm does not face a perfectly elastic demand curve. This indicates that society values additional units of this good more than alternative products, so allocative efficiency is not realized.

    Furthermore, production takes place short of the least-cost output level resulting in higher unit costs than the minimum attainable. Monopolistically competitive firms tend to be underutilized because there are so many competitors in the same industry that it is overcrowded with firms. Also, some argue that advertising is an unnecessary cost of production that contributes to high costs and prices. In other words, productive efficiency is not realized either.

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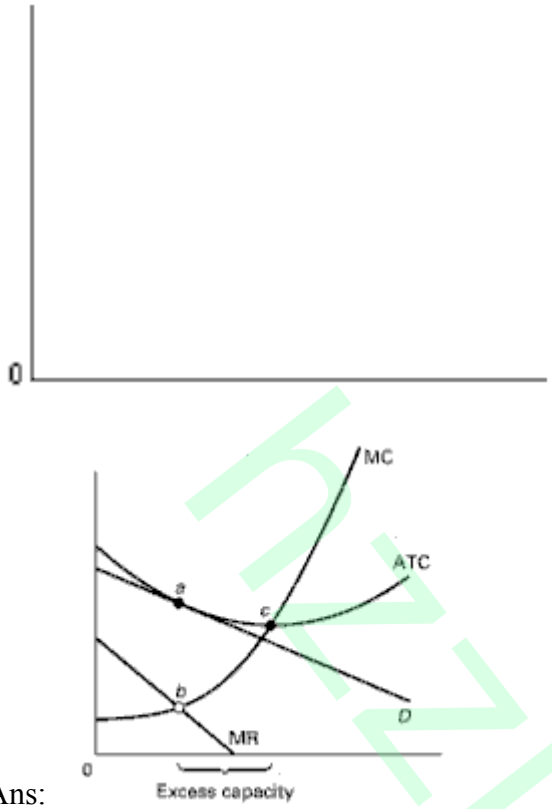
    Learning Objective: 9.2

14. Draw a graph of the cost curves for a monopolistically competitive firm that clearly illustrates the excess capacity that arises in the long run. Explain why this excess capacity arises.

Ans:



Productive efficiency is not achieved by a monopolistically competitive firm because output is not produced at the minimum of average total cost for the firm. By restricting output, firms create excess capacity.

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15. What conditions characterize a monopolistically competitive firm in long-run equilibrium?
    Ans: In long-run equilibrium, a monopolistically competitive firm is maximizing profit. Therefore, the firm is producing where MR=MC. However, at this level of output, P>MC because the firm faces a downward sloping demand for its product. Therefore, allocative efficiency is not achieved. Furthermore, at its profit maximizing level of output, the firm is not producing the output where ATC is minimized. Therefore, the firm is operating with excess capacity and productive efficiency is not achieved. Finally, the firm is making zero economic profit because of the ease of entry and exit of competitors. Therefore, P=ATC.

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    Learning Objective: 9.2

16. Why do monopolistically competitive firms spend funds for product differentiation and advertising when this practice only adds to the firm's costs?
    Ans: The long-run equilibrium condition for the representative firm in monopolistic competition indicates that the firm will only break even or earn normal profits. The firm, however, may try to improve on this long-run condition by spending funds on new product differentiation or advertising. These expenditures may be justified and delay the long-run equilibrium if demand increases by an amount sufficient to cover these costs. The firm is unlikely to improve its economic profits through price cutting, so some form of non-price competition is needed. Spending funds for product differentiation, product development, or advertising makes sense if demand increases and the new revenues cover these costs.

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17. Explain how monopolistically competitive producers try to improve on the condition of just breaking even in the long run. Is this improvement a benefit for consumers?
    Ans: Firms use product differentiation and product improvement as a long-run strategy to make their products significantly different from those produced by their rivals. The use of these tactics can make a product unique and tend to make the demand for the product more inelastic. They can also increase the demand for the product, which would increase the firm's profits when costs remain constant or increase at a slower rate than revenues.

    Product differentiation is achieved through differences in product quality and the introduction of new brands, types, styles, and other forms of non-price competition. Product improvement encourages technological innovation and change that makes a product better over time.

    Whether product differentiation and product improvement contribute substantially to more consumer welfare is a debatable question, and there are trade-offs. Consumers will enjoy more choice and variety in the selection of products under monopolistic competition, but it also creates more excess capacity and economic inefficiency.

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    Learning Objective: 9.2

18. Explain why the economic analysis of monopolistic competition is so complex.
    Ans: The model of the monopolistically competitive firm as presented in this chapter is a simplification of a great deal of complexity that is found in this market structure. The monopolistically competitive firm has some control over the three factors (price, product, and advertising) but there are many combinations of these factors for a particular firm. The model of the representative firm in monopolistic competition does not take into account all the combinations or all the degrees to which these factors can be changed. In addition, the basic model also does not take into account how rivals will react to changes in any one of the factors.

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19. What are the basic characteristics of oligopoly? How does oligopoly compare with the other market structures?

Ans: Oligopoly exists when just a few large firms dominate a market in contrast to a pure monopoly where one firm dominates the market. The few firms often have some control over price, but that control is more limited than in monopoly because of the interdependence and some degree of competition in the industry. Each firm must consider the reactions of rivals when considering changes in output and price.

The barriers to entry that explain why monopoly exists also explain why oligopolies exist. These entry barriers are the result of economies of scale in an industry where economic efficiency is increased when a few firms supply output for a market. They can also arise from ownership of patents, exclusive licenses, substantial control over essential resources, and merger.

As with monopolistic competitors, oligopolies can compete on the basis of price or use non-price competition. The role of non-price competition is most important for differentiated oligopolies that are found in consumer goods industries producing such products as breakfast cereals, automobiles, camera film, and cigarettes. Homogeneous oligopolies that produce standardized products would engage in less non-price competition although they might compete on the basis of service. Examples of homogeneous oligopolies would be firms that produce metals (steel, aluminum, or copper) or chemicals. Oligopolies are common throughout North American industry.

The purely competitive firm produces a standardized product at the market price. Unlike oligopoly, the firm is small in size, there are no interdependencies among firms, the firm has no control over price, and uses no advertising or non-price competition.

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Learning Objective: 9.3

20. Explain how economists use concentration ratios. What are the shortcomings or limitations of these measures?
    Ans: The most typical type of concentration ratio is the "four-firm" ratio that indicates the percentage of output produced by the four largest firms in an industry. If the four top firms produce over 40% of the output in an industry, the industry is considered to be oligopolistic.

    Concentration ratios have four shortcomings. First, they do not take into account local conditions. Concentration ratios are estimated for the nation as a whole, but there can be a high degree of concentration in local markets even when the national concentration ratio is low. Second, there can be inter-industry competition that limits the degree of market power, but this competition will not be captured by concentration ratios that are based on industry definitions. Third, concentration ratios are based on domestic output and do not take into account import competition, which can lessen the degree of market power in domestic industries. Fourth, concentration ratios do not measure the distribution of market power among the top four firms. A concentration ratio will not distinguish the difference in cases where two firms or four firms dominate an industry.

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    Learning Objective: 9.3

21. What is the Herfindahl index and how is it calculated?
    Ans: The Herfindahl index is a way to measure market concentration that takes into account the size of market shares held by firms. It measures the sum of the squared market shares of each firm in the industry. It gives a greater weight to firms with large market shares. A high Herfindahl index number indicates a high degree of concentration in one or two firms. A lower index might means that a number of firms have rather equal shares of the market. For example, if there were only one firm in the industry, the Herfindahl index would be 10,000 [100^2]. If four firms in an industry each had a 25 percent share, the index would be 2,500 [$25^2+25^2+25^2+25^2$]. A high index might be where one firm has 85 percent of the industry and the other three have 5 percent each for a total of 7,300 [$85^2+5^2+5^2+5^2$].

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    Learning Objective: 9.3

22. In the table below are data on five different industries and the market shares for each of the firms in the industry. Assume that there is no foreign competition, entry into the industry is difficult, and that no firm in each industry is on the verge of bankruptcy. In the column to the right of the table, calculate the Herfindahl index.

	Market Share of Firms in Industry						Herfindahl
Industry	**1**	**2**	**3**	**4**	**5**	**6**	**index**
Alpha	33	22	14	12	10	9	_____
Beta	25	25	25	15	10		_____
Kappa	20	20	20	20	20		_____
Delta	60	10	10	10	10		_____
Epsilon	25	20	15	15	15	10	_____

Ans: Which industry has the most market power and which industry has the least?

	Market Share of Firms in Industry						Herfindahl
Industry	**1**	**2**	**3**	**4**	**5**	**6**	**Index**
Alpha	33	22	14	12	10	9	2094
Beta	25	25	25	15	10		2200
Kappa	20	20	20	20	20		2000
Delta	60	10	10	10	10		4000
Epsilon	25	20	15	15	15	10	1800

Industry Delta has the most market power while Industry Epsilon has the least.

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Learning Objective: 9.3

23. In the table below are data on five different industries and the market shares for each of the firms in the industry. Assume that there is no foreign competition, entry into the industry is difficult, and that no firm in each industry is on the verge of bankruptcy. In the column to the right of the table, calculate the Herfindahl index.

	Market Share of Firms in Industry						Herfindahl
Industry	**1**	**2**	**3**	**4**	**5**	**6**	**index**
Aviation	25	20	15	15	15	10	_____
Textiles	25	25	25	15	10		_____
Computers	60	10	10	10	10		_____
Chemicals	20	20	20	20	20		_____
Automotive	33	22	14	12	10	9	_____

Ans: Which industry has the most market power and which industry has the least?

	Market Share of Firms in Industry						Herfindahl
Industry	**1**	**2**	**3**	**4**	**5**	**6**	**index**
Aviation	25	20	15	15	15	10	1800
Textiles	25	25	25	15	10		2200
Computers	60	10	10	10	10		4000
Chemicals	20	20	20	20	20		2000
Automotive	33	22	14	12	10	9	2094

The computer industry has the most market power while the aviation industry has the least.

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Learning Objective: 9.3

24. What are the basic elements of a game?
Ans: A game consists of participants or players, rules that define how players can behave, strategies or courses of action, and payoffs or outcomes that result from the strategies chosen.

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Learning Objective: 9.4

25. Consider the following payoff matrix in which the numbers indicate the profit in millions of dollars for a duopoly. This decision is only made once.

		Firm A	
		Choice 1	**Choice 2**
Firm B	**Choice 1**	A = \$500 B = \$500	A = \$800 B = \$100
	Choice 2	A = \$100 B = \$800	A = \$300 B = \$300

(a) Does this game have a dominant strategy equilibrium? If so, what is it?

(b) Suppose both firms opted for Choice 1. Would either firm now wish they had made a different choice?

(c) Suppose both firms opted for Choice 2. Would either firm now wish they had made a different choice?

Ans: (a) The dominant strategy equilibrium in this game arises when both firms choose Choice 2.

(b) Suppose you are Firm B. Had you known Firm A was opting for Choice 1, you would have earned more had you opted for Choice 2 (you would get \$800 instead of \$500). The same can be done for Firm A.

(c) Suppose you are Firm B. Had you known Firm A was opting for Choice 2, you would have earned less had you opted for Choice1 (you would get \$100 instead of \$300); as Firm B you would not want to change your decision.. The same argument can be made for Firm A.

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Learning Objective: 9.4

26. Consider the following payoff matrix in which the numbers indicate the profit in millions of dollars for a duopoly.

		Firm A	
		Choice 1	**Choice 2**
Firm B	**Choice 1**	A = $500 B = $300	A = $400 B = $500
	Choice 2	A = $200 B = $400	A = $100 B = $200

(a) Does this game have a dominant strategy equilibrium? If so, what is it?

(b) Can you find a set of choices such that no firm would wish to change its mind given the choice of the other firm?

Ans: (a) There is no dominant strategy equilibrium in this game. While Firm A has a dominant strategy, Choice 1, Firm B does not. Firm B's strategy depends on Firm A's choice.

(b) This can best be done by trial and error – at most you'll need four tries. Suppose both Firm A and Firm B make Choice 1. Firm A is happy as Choice 1 is its dominant strategy which is the best choice it can make no matter what Firm B chooses. Firm B, however, knowing that Firm A made Choice 1 would prefer to make Choice 2 (Firm B would make $400 instead of $300).

Now let's try Firm A makes Choice 1 and Firm B makes Choice 2. We already know that Firm A is happy as Choice 1 is Firm A's dominant strategy. Consider Firm B. Would that firm want to change its decision to Choice 1 instead of Choice 2? No. Under Choice 1 Firm B only makes $300 whereas under Choice 2 it makes $400 (when Firm A has decided on Choice 1 for itself). Thus the answer is Firm A making Choice 1 and Firm B making Choice 2.

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Learning Objective: 9.4

27. The police catch two criminals that are suspected of having committed more serious crimes and want to extract confessions from them. What would an economist suggest to ensure the police are successful?
    Ans: The police can extract confessions from the criminals by engaging them in a Prisoner's Dilemma type game. It is critical that the criminals be separated so that communication between them is impossible. Furthermore, incentives must be structured so that each criminal has an incentive to confess. Specifically, in situations where one criminal confesses and the other does not, the penalty for the one that chooses not to confess must be more severe than that if both confess. In other words, incentives must be structured so that each criminal's dominant strategy is to confess.

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    Learning Objective: 9.4

28. What three conclusions can be drawn from the game theory view of oligopoly?
    Ans: First, firms in an oligopolistic industry are "mutually interdependent" and must consider the actions of rivals when they make pricing decisions. Second, oligopoly often leads to overt or covert collusion among the firms to fix prices or to coordinate pricing because competition often results in lower prices and profits. Collusion can help maintain higher prices and profits. Third, collusion creates incentives for firms to cheat on collusive agreements because higher profits can be made if a firm can successfully cheat on an agreement while the other firms maintain their prices.

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    Learning Objective: 9.4

29. Consider the following payoff matrix in which the numbers indicate the profit in millions of dollars for a duopoly based either on a high-price or a low-price strategy.

		Firm A	
		High-price	**Low-price**
Firm B	**High-price**	A = $500 B = $500	A = $650 B = $300
	Low-price	A = $300 B = $650	A = $400 B = $400

(a) What will be the result when each firm chooses a high-price strategy?

(b) What will be the result when Firm A chooses a low-price strategy while Firm B maintains a high-price strategy?

(c) What will be the result when Firm B chooses a low-price strategy while Firm A maintains a high-price strategy?

(d) What will be the result when each firm chooses a low-price strategy?

(e) What two conclusions can you draw about collusion?

Ans: (a) Each firm will earn $500 million in profit for a total of $1,000 million for the two firms.

(b) Firm A will earn $650 million and Firm B will earn $300 million. Compared to the high-price strategy, Firm A has an incentive to cut prices because it will earn $150 million more in profit and Firm B will earn $200 million less in profit. Together, the firms will earn $950 million in profit, which is $50 million less than with a high-price strategy.

(c) Firm B has an incentive to cut prices because it will earn $650 million and Firm A will earn $300 million. Compared to a high-price strategy, Firm B will earn $150 million more in profit and Firm A will earn $200 million less in profit. Together, the firms will earn $950 million in profit, which is $50 million less than with a high-price strategy.

(d) Each firm will earn $400 million in profit for a total of $800 million for the two firms. This total is $200 million less than with a high-price strategy.

(e) First, the two firms have a strong incentive to collude and adopt the high-price strategy because there is the potential for $200 million more in profit for the two firms than with a low-price strategy, or the potential for $50 million more for the two firms than with a mixed-price strategy.

Second, there is also a strong incentive for each firm to cheat on the agreement and adopt a low-price strategy when the other firm maintains a high-price strategy because this situation will produce $150 million more in profit for the cheating firm compared to honouring a collusive agreement for a high-price strategy.

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Learning Objective: 9.4

30. Consider the following payoff matrix in which the numbers indicate the profit in millions of dollars for a duopoly based either on a high-price or a low-price strategy.

		Firm A	
		High-price	**Low-price**
Firm B	**High-price**	A = \$150 B = \$150	A = \$200 B = \$ 90
	Low-price	A = \$ 90 B = \$200	A = \$100 B = \$100

(a) What will be the result when each firm chooses a high-price strategy?

(b) What will be the result when Firm A chooses a low-price strategy while Firm B maintains a high-price strategy?

(c) What will be the result when Firm B chooses a low-price strategy while Firm A maintains a high-price strategy?

(d) What will be the result when each firm chooses a low-price strategy?

(e) What two conclusions can you draw about collusion?

Ans: (a) Each firm will earn \$150 million in profit for a total of \$300 million for the two firms.

(b) Firm A will earn \$200 million and Firm B will earn \$90 million. Compared to the high-price strategy, Firm A has an incentive to cut prices because it will earn \$50 million more in profit and Firm B will earn \$60 million less in profit. Together, the firms will earn \$290 million in profit, which is \$10 million less than with a high-price strategy.

(c) Firm B has an incentive to cut prices because it will earn \$200 million and Firm A will earn \$90 million. Compared to a high-price strategy, Firm B will earn \$50 million more in profit and Firm A will earn \$60 million less in profit. Together, the firms will earn \$290 million in profit, which is \$10 million less than with a high-price strategy.

(d) Each firm will earn \$100 million in profit for a total of \$200 million for the two firms. This total is \$100 million less than with a high-price strategy.

(e) First, the two firms have a strong incentive to collude and adopt the high-price strategy because there is the potential for \$100 million more in profit for the two firms than with a low-price strategy, or the potential for \$10 million more for the two firms than with a mixed-price strategy.

Second, there is also a strong incentive for each firm to cheat on the agreement and adopt a low-price strategy when the other firm maintains a high-price strategy because this situation will produce $50 million more in profit for the cheating firm compared to honouring a collusive agreement for a high-price strategy.

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Learning Objective: 9.4

31. Complete the following payoff matrix such that (1) the firms are better off by colluding with each other, and (2) there is an incentive for each firm to cheat.

		Firm A	
		High-price	**Low-price**
Firm B	**High-price**	A = $___ B = $___	A = $___ B = $___
	Low-price	A = $___ B = $___	A = $___ B = $___

Ans: There are any number of possible solutions. However, all correct solutions must satisfy the following conditions: (1) the dominant strategy for each firm is to set a low price, (2) the payoff for each firm is higher when they both set a high price than when they both set a low price, and (3) the sum of the two firms' payoffs is the highest when both set a high price. The following is one possible solution.

		Firm A	
		High-price	**Low-price**
Firm B	**High-price**	A = $300 B = $300	A = $400 B = $100
	Low-price	A = $100 B = $400	A = $200 B = $200

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Learning Objective: 9.4

32. Why is the economic analysis of oligopoly so difficult? What two generalizations can be made about the pricing behaviour of oligopolists?
    Ans: Oligopoly is hard to analyze because it covers many different market situations. There are both homogeneous and differentiated oligopolies. The number of firms that dominate oligopolies can vary substantially, for example from two or three firms to ten firms. Mutual interdependence among rivals also makes it difficult to estimate a demand curve for a firm. Each firm must consider the reaction of rivals in establishing its price policy.

    Despite the difficulties of analyzing oligopolies, two important generalizations can be made about this market structure. First, oligopolies tend to have inflexible prices. Second, oligopolies tend to change price simultaneously.

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    Learning Objective: 9.5

33. Explain in nontechnical terms why oligopolistic prices may tend to be inflexible.
    Ans: An oligopolist will hesitate to raise its prices in the absence of collusion because if its rivals do not follow with price rises of their own the firm will lose market share to these rivals. The oligopolist will also hesitate to lower its price because it assumes that its few rivals will immediately feel the impact in terms of lost market share, and they will also have to lower their prices to maintain their market position. Since each oligopolist will be reluctant to raise or lower prices in the absence of collusion, this leads to inflexible prices.

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    Learning Objective: 9.5

34. An oligopoly producing a homogeneous product is composed of three firms that act like a cartel. Assume that these three firms have identical cost schedules and that if any one of these firms sets a price for the product, the other two firms charge the same price. As long as they all charge the same price they will share the market equally; and the quantity demanded of each will be the same.

Below is the total-cost schedule of one of these firms and the demand schedule that confronts it when the other firms charge the same price as this firm. Complete the marginal-cost and marginal-revenue schedules facing the firm.

Output	Total Cost	Marginal cost	Price	Quantity Demanded	Marginal revenue
0	$0				
1	60	$_____	$260	1	$_____
2	100	_____	240	2	_____
3	160	_____	220	3	_____
4	240	_____	200	4	_____
5	340	_____	180	5	_____
6	460	_____	160	6	_____
7	600	_____	140	7	_____
8	760	_____	120	8	_____

(a) What price would be charged, what output would be produced, and what profit would be made by this firm?

(b) If the firms collude to maximize joint profits, what would be the industry price, output, and profit?

Ans:

Output	Total cost	Marginal cost	Price	Quantity demanded	Marginal revenue
0	$0				
1	60	$60	$260	1	$260
2	100	40	240	2	220
3	160	60	220	3	180
4	240	80	200	4	140
5	340	100	180	5	100
6	460	120	160	6	60
7	600	140	140	7	20
8	760	160	120	8	–20

(a) The firm would charge a price of $180, set output at 5 units, and make a profit of $560 [$900 – $340].

(b) The three firms have identical costs and demand schedules. They would set price at $180 and produce 15 units [3 firms x 5 units]. Industry profits would be $1,680 [3 x $560].

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Learning Objective: 9.5

35. An oligopoly producing a homogeneous product is comprised of three firms that act like a cartel. Assume that these three firms have identical cost schedules. Assume also that if any one of these firms sets a price for the product, the other two firms charge the same price. As long as they all charge the same price they will share the market equally; and the quantity demanded of each will be the same.

Below is the total-cost schedule of one of these firms and the demand schedule that confronts it when the other firms charge the same price as this firm. Complete the marginal-cost and marginal-revenue schedules facing the firm.

Output	Total cost	Marginal cost	Price	Quantity demanded	Marginal revenue
0	$0				
1	180	$_____	$780	1	$_____
2	300	_____	720	2	_____
3	480	_____	660	3	_____
4	720	_____	600	4	_____
5	1,020	_____	540	5	_____
6	1,380	_____	480	6	_____
7	1,800	_____	420	7	_____
8	2,280	_____	360	8	_____

(a) What price would be charged, what output would be produced, and what profit would be made by this firm?

(b) If the firms collude to maximize joint profits, what would be the industry price, output, and profit?

Ans:

Output	Total cost	Marginal cost	Price	Quantity demanded	Marginal revenue
0	$0				
1	180	$180	$780	1	$780
2	300	120	720	2	660
3	480	180	660	3	540
4	720	240	600	4	420
5	1,020	300	540	5	300
6	1,380	360	480	6	180
7	1,800	420	420	7	60
8	2,280	480	360	8	–60

(a) The firm would charge a price of $540, set output at 5 units and make a profit of $1,680 [$2,700 – $1,020].

(b) The three firms have identical costs and demand schedules. They would set price at $540 and produce 15 units [3 firms x 5 units]. Industry profits would be $5,040 [3 x $1,680].

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Learning Objective: 9.5

36. Explain the collusive pricing model of oligopoly behaviour.
    Ans: The collusive pricing model is similar to the pure monopolist model of pricing. In this case, firms collude and act as one firm to set price and output that maximize joint profits of all firms. The methods of collusion may be overt, as in the OPEC oil cartel, or they may be covert as in "a tacit understanding." There are also a number of obstacles to collusion that make it difficult to sustain over time: differences in demand and costs for firms; the number of firms in an agreement; incentives to cheat; changing economic conditions; entry by other firms; and legal restrictions and penalties.

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    Learning Objective: 9.5

37. Where does non-collusive behaviour materialize in the collusive pricing model?
    Ans: Cooperation between firms can break down in collusive pricing when price wars erupt as a result of firms engaging in cheating to increase their sales and profit or as a result of buyers playing rivals off each other to extract price concessions.

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    Learning Objective: 9.5

38. What obstacles might a group of oligopolists encounter in forming a cartel? A tacit understanding?
    Ans: First, within Canada both forms of collusion are violations of existing anti-combines laws. A tacit understanding would be more difficult to detect, and may not face as tough a barrier as the cartel.

    Where cartels are legal, obstacles still exist. Demand and cost differences may make it difficult for producers to agree on price and market share. The number of producers may make any agreement difficult to enforce, and in any case, there will be an economic incentive to cheat, which is another obstacle to successful collusion. The potential for new entrants into the industry is another obstacle that tends to inhibit collusion of both kinds. In this latter regard, a cartel would have more ability to prevent potential entrants than a simple tacit understanding and so has more chance for success in overcoming this obstacle. Finally, a drop in sales (perhaps due to a recession) and the resulting reduction in profit may cause some firms to cut their price at the expense of their rivals.

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    Learning Objective: 9.5

39. What is the price leadership model of oligopoly pricing and what are its tactics?
    Ans: Price leadership is a covert implicit form of collusion in which one firm traditionally initiates price changes and the other firms in the industry follow the lead. Three price leadership tactics have been observed. First, price adjustments tend to be made infrequently and only when cost and demand conditions change to a significant degree. Second, the price leader will announce price changes through speeches, announcements, or other such activities to solicit a consensus. Third, the going price may not maximize profit in the short-run for the firms in the industry, especially if the firms want to prevent entry by other firms.

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    Learning Objective: 9.5

40. Where does non-collusive behaviour materialize in the price leadership model?
    Ans: Collusion can break down in price leadership if firms choose not to follow the price leader and engage in price wars. However, such occurrences tend to be short lived as firms recognize the impact of such actions on reducing profits. To limit the possibility of price wars, the price leader makes infrequent price changes.

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    Learning Objective: 9.5

41. Evaluate. Oligopolies are characterized by collusive behaviour.
    Ans: Collusion is not the only behaviour of oligopolies. As a result of the diversity of oligopolies, one type of behaviour is insufficient to explain all oligopolistic behaviour. While cooperation is beneficial, firms in oligopolies can engage in non-collusive behaviour. Even in the cooperative models such as collusive pricing and price leadership, collusion can break down. Indeed, there are incentives for individual firms to not cooperate. As in the two-firm, Prisoner's Dilemma-type game, an individual firm can increase its profit at the expense of its rival by cheating. Furthermore, since overt collusion in the form of cartels is illegal in Canada, firms that wish to cooperative must do so in secret. However, such less formal agreements are more difficult to enforce. Firms also face other barriers to collusion. When cost and demand conditions differ for rivals, agreements on price and market shares are difficult to reach. Also, recessions can alter demand conditions and again make collusion difficult. Finally, the greater the number of firms in the industry, cooperation is more difficult.

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    Learning Objective: 9.5

42. Why is there emphasis on non-price competition in oligopoly?
    Ans: The reasons stem from two basic facts. First, non-price competition is less likely to get out of hand than is price competition. Price competition among oligopolists can lead to costly price wars because any price change can be easily matched by a rival firm. Non-price competition is less easy to duplicate and may give an oligopolist a temporary or permanent advantage over a rival. The areas for non-price competition might entail product changes, improved production or services, or advertising campaigns. Second, oligopolies have greater financial resources to invest in non-price competition in such areas as product development or advertising. Oligopolists have more resources than monopolistic competitors to engage in this type of competition for long periods of time.

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    Learning Objective: 9.6

43. Describe the positive and negative views of the economics of advertising.
    Ans: The arguments over advertising focus on three major questions: (a) Is advertising persuasive or informative? (b) Does advertising promote monopoly power or competition? (c) Does advertising contribute to economic waste or economic efficiency?

    In the positive view, advertising gives consumers information about product characteristics and prices that help them make more rational purchases, and promotes consumer welfare by reducing "search" costs. Advertising also gives firms the ability to compete with other firms for market share, thereby promoting rather than restricting competition. This increased competition increases awareness of substitute products, reduces each firm's product demand, and makes the demand curve more elastic. Overall, advertising contributes to economic efficiency by reducing consumer search costs and creating awareness of other products, by promoting more competition among firms, and by permitting the introduction of new technology. More competition contributes to the realization of allocative and productive efficiency.

    In the negative view, advertising manipulates consumer demand through persuasion. It also creates "brand loyalty" that makes the demand curve more inelastic, and fosters monopoly power among the successful firms in an industry. Advertising is also criticized for being wasteful, and for preventing the realization of both allocative and productive efficiency. Advertising can also be self-cancelling or offsetting, and thus a waste of resources.

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    Learning Objective: 9.6

44. What are three qualifications to the view that allocative and productive efficiency are not realized in oligopoly?
    Ans: Oligopoly is thought to be allocatively and productively inefficient because price will exceed marginal cost and output will be less than the minimum average-cost level of output. One qualification to this view is that foreign competition has made many oligopolistic industries much more competitive when viewed on a global scale. A second qualification is that oligopolistic firms may keep prices lower in the short run to deter entry of new firms. A third qualification is that oligopolistic industries tend to foster more rapid product development and improvement in production than if the industry were purely competitive. The oligopolists have more funds for research and development and the barriers to entry can protect the firm's investment. Thus oligopoly may have some redeeming virtues that offset its apparent inefficiencies.

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    Learning Objective: 9.6

45. "Perfectly competitive firms sell their product at the same price. This is also true in some oligopolistic markets with standardized products. Therefore, these oligopolies are actually highly competitive." Evaluate critically.
    Ans: These oligopolies are rivals, but they are not competitive in the economic sense that leads them to produce at the most efficient price and output level. Production takes place at an output level where MR = MC, but price will be above MR so the firm will earn economic profits, and allocative efficiency will not be achieved. Furthermore, the lack of competition may mean that the firm is not forced to produce at the point of minimum average cost, so productive efficiency is not achieved.

    Perfectly competitive industries, on the other hand, achieve both productive and allocative efficiency, because competition brings price and output to the level where production is at minimum average cost and economic profits disappear.

    It might be pointed out that monopolies also sell their product at a single price, but that does not make a monopoly highly competitive.

    Page: 184-187, 212-213, 241-242
    Learning Objective: 7.6, 8.6, 9.6

46. Compare perfect competition, monopoly, monopolistic competition, and oligopoly on each of the following points: (a) price-setting ability and market power, (b) product development, (c) cost reduction, (d) advertising, (e) employment stability, (f) price flexibility, and (g) productive and allocative efficiency.

Ans: (a) Firms have least ability to manipulate price in perfect competition, some ability in oligopoly depending on conditions, a slight ability under monopolistic competition, and total ability in a monopoly.

(b) In the strict model of perfect competition, firms have little ability to achieve technological advance in product development because they do not earn economic profits. One might argue that the highest degree of product development would come under oligopoly because of the investment potential and rivalry but the empirical evidence does not always support this conclusion. Monopoly has only the threat of potential competition to motivate its product development, and monopolistic competition would be motivated by competition, but may not have the resources for extensive product development.

(c) Under perfect and monopolistic competition there would be much incentive and pressure for improved production methods. With regard to the other two market models, the answer is essentially the same as for part (b) above.

(d) Perfectly competitive firms would spend virtually nothing on advertising. Monopolistic competitors and oligopolies with differentiated products would spend the most. Monopolies would probably spend a slight amount on informative advertising.

(e) Monopoly would provide the highest degree of employment stability. It would be difficult to predict the degree of stability among the other three models, but none would be very stable.

(f) Prices would be most flexible under monopolistic competition and pure competition. Under perfect competition, prices would change only if market demand or supply conditions changed, but the firm would not have control over this flexibility. Prices under oligopoly would not be flexible; rather output adjustments would tend to be made to changing demand conditions. Monopoly prices could be flexible in response to changing demand or cost conditions.

(g) Productive and allocative efficiency are achieved only under conditions of perfect competition, with the qualification that in some industries, economies of scale dictate some other market model to achieve efficiency. Among the other three models, it would depend on the circumstances. In a regulated, natural monopoly, efficiency may nearly be achieved. In monopolistic competition without excessive advertising, and in oligopolies realizing economies of scale, efficiency may be attained.

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Learning Objective: 7.1-7.6, 8.1-8.3, 8.6, 9.1-9.6

47. Describe the major demand and supply factors that have turned the beer industry into an oligopoly over the years.
Ans: In 1945 there were 60 independent brewers in Canada, but today the two major brewers account for almost 90 percent of the market. One reason for this change is that demand changed. Preferences shifted from stronger-flavoured beers to lighter, dryer products. Consumption also shifted from taverns to homes, which resulted in a different kind of packaging. On the supply-side, technology changed and produced significant economies of scale that now constitute a barrier to entry. Also mergers that have occurred are a fundamental cause of increased concentration. Advertising and product differentiation have been important in the growth of some firms and as a way to create market dominance.

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Learning Objective: Last Word

48. What is the difference between a positive-sum and a zero-sum game?
Ans: In a positive-sum gain, players can jointly win (hence the phrase "win-win"). The prisoner's dilemma is a positive sum game. In a zero-sum game, one players' gain is another player's loss. Checkers is an example of a zero-sum game.

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Learning Objective: Appendix

49. Consider the following payoff matrix in which the numbers indicate the profit in millions of dollars for a duopoly based either on a high-price or a low-price strategy.

		Firm A	
		High-price	**Low-price**
Firm B	**High-price**	A = $500 B = $500	A = $650 B = $300
	Low-price	A = $300 B = $650	A = $400 B = $400

(a) Does this game have a dominant strategy equilibrium? Explain.

(b) Does this game have a Nash equilibrium? Explain.

Ans: (a) No matter Firm A's pricing strategy, Firm B finds it more profitable to adopt a low-price strategy, so low-price is Firm B's dominant strategy. No matter Firm B's pricing strategy, Firm A always finds it better to choose a low-price. Thus low-price / low-price is the dominant strategy.

(b) First, if there is a dominant strategy equilibrium then it is a Nash equilibrium. More generally, we should think of the Nash equilibrium as the set of strategies such that given the strategies used by others, no one would like to change. Look at low-price / low-price. Given Firm B has chosen low-price, Firm A would not want to change to high-price. Given Firm A has chosen low-price, Firm B would not want to change to high-price. Each firm is best-responding (doing the best it can) to each other firms' best-response.

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Learning Objective: Appendix

50. Consider the following payoff matrix in which the numbers indicate the profit in millions of dollars for a duopoly.

		Firm A	
		Choice 1	**Choice 2**
Firm B	**Choice 1**	A = $500 B = $300	A = $400 B = $500
	Choice 2	A = $200 B = $400	A = $100 B = $200

Is there a Nash equilibrium in this game? Explain.

Ans: This can best be done by trial and error – at most you'll need four tries. First however, note that Choice 1 is a dominant strategy for Firm A. This simplifies things because if a Nash equilibrium exists, it must be the case that Firm A has adopted Choice 1.

Now suppose both Firm A and Firm B make Choice 1. Firm A is happy as Choice 1 is its dominant strategy which is the best choice it can make no matter what Firm B chooses. Firm B, however, knowing that Firm A made Choice 1 would prefer to make Choice 2 (Firm B would make $400 instead of $300).

Now let's try Firm A makes Choice 1 and Firm B makes Choice 2. We already know that Firm A is happy as Choice 1 is Firm A's dominant strategy. Consider Firm B. Would that firm want to change its decision to Choice 1 instead of Choice 2? No. Under Choice 1 Firm B only makes $300 whereas under Choice 2 it makes $400 (when Firm A has decided on Choice 1 for itself). Thus Firm A making Choice 1 and Firm B making Choice 2 is a Nash equilibrium.

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Learning Objective: Appendix

51. Consider the following payoff matrix in which the numbers indicate the projected profit in millions of dollars for different advertising campaigns for two cola companies during the Superbowl.

		Croke	
		Costly Ads	**Low Ads**
Popsi	**Costly Ads**	C = \$9.5 P = \$8.5	C = \$6 P = \$11
	Low Ads	C = \$13 P = \$4	C = \$11 P = \$10

(a) What is the Nash equilibrium?

(b) Suppose you are the advertising manager for Croke and you have a meeting with your counterpart at Popsi. At this meeting you decide to agree to a low-budget advertising campaign, and shake hands on the deal. If you never expect to work against this advertising manager again, what will you likely do? What will she likely do?

(c) How might your answer to (b) change if you expected to deal with the Popsi manager again in the future?

(d) How might you, as the advertising manager for Croke, use a credible threat to generate a cooperative outcome?

Ans: (a) The Nash equilibrium is for both companies to engage in a costly advertising campaign. Notice that the costly ad campaign is the dominant strategy equilibrium. Equivalently, given Croke has adopted a costly campaign then Popsi would not want to adopt a strategy other than the costly one. The same holds from Croke; given Popsi has adopted a costly campaign, Croke would also want to adopt a costly campaign.

(b) You would likely agree that the low-cost campaign would be better-off for both of you, so you would walk away with a handshake agreement to only launch low-cost campaigns. Given you will never work against her again, you'd immediately go back to your office and develop an expensive ad blitz; notice that, as compared to your profit of \$11 million at the low ads / low ads outcome, you stand to make \$13 million if you engage in a costly campaign while the Popsi manager adopts a low-cost campaign. Unfortunately for you, the Popsi manager has exactly the same incentives.

(c) If you expect to deal with this Pospi manager again in the future, then this changes from a one-shot game to a repeated game. In a repeated game, you can build up a reputation. You can also reciprocate for any good behaviour shown to you ("if you scratch my back, I'll scratch yours"). In this instance, you may very-well agree to keep advertising costs low to avoid expensive and less-profitable ad campaigns in the future.

(d) First, you must realize that when both firms engage in low-cost advertising

campaigns, you have reached the cooperative outcome. Looking at the payoff outcomes, it seems that Croke has a cost advantage (i.e., it makes more profit than Popsi for similar strategy outcomes). Suppose you threatened to engage in a "super-costly advertising blitz" if you thought Popsi was at all going to break a deal to engage in low-cost advertising. This mega-expensive blitz would drive your profits to near zero, but would lead to negative profits for Popsi no matter what Popsi decided to do. This sort of threat might convince Popsi to cooperate.

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Learning Objective: Appendix

52. Describe how the first-mover advantage might work if there are two companies thinking of launching a similar product.

Ans: Suppose two companies are attempting to bring very similar products to wide-scale production for the market. There is not room enough for both products to compete on an ongoing basis. The first to bring their product to market and attract a threshold number of users (called a network externality) will gather the whole market. In order to meet this goal, firms will often spend extra money rushing product R&D, creating news buzz about their products, and engaging in extremely expensive product launches. Examples include VHS versus Beta video tapes, Blu-Ray versus HD-DVD for high-capacity DVDs, and the ongoing competition between iPhone and Google's Nexus One phone.

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Learning Objective: Appendix