BAYLOR UNIVERSITY
HANKAMER SCHOOL OF BUSINESS
DEPARTMENT OF ECONOMICS

Managerial Economics
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Sample Final Exam
Fall 2009

Name ___SAMPLE EXAM KEY___

Instructions: This sample final exam consists of 30 multiple-choice questions. At your option, you may complete this sample exam and turn it in by no later than the beginning of class on Monday, December 7. If you take me up on this offer, then you can earn *up to* 20 extra points that will be added to your lowest problem set score in ECO 5315.

If you decide to exercise this option, download and fill in the spreadsheet template located at http://economics.garven.com/fall2009/eco5315samplefinalexam.xls, and email it to eco5315@gmail.com. Since the review session on December 7th will be devoted primarily to working through this exam, you will want to keep your copy of the exam booklet so that you can reference it during the review.

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1. Maximum profit occurs wherever

   A. the slope of the total revenue function equals marginal revenue.
   B. the slope of the total revenue function equals marginal cost.
   C. the slope of the total revenue function is maximized.
   D. the total revenue is maximized.
   E. none of the above.

Note: $\pi(Q) = TR(Q) - TC(Q); \frac{\pi(Q)}{dQ} = MR(Q^*) - MC(Q^*) = 0; \therefore MR(Q^*) = MC(Q^*).$

Here, $MR(Q^*)$ is the slope of the total revenue function.

2. The demand for answering machines is Q = 1,000 - 150P + 25I. Assume that per capita disposable income I is \$200. When the price of answering machines is P = \$10, the price elasticity of demand is

   A. -3.0.
   B. -3.33.
   C. -1.33.
   D. -0.33.
   E. -1.0.

Note: Q = 1,000 - 150P + 25I = Q = 1,000 - 150P + 25(200) = 6,000 – 150P = 6,000 – 1,500 = 4,500. $\therefore dQ/dP = -150$, $P/Q = 10/4{,}500$, and $\eta = (dQ/dP)(P/Q) = -150(10/4{,}500) = -0.33$.

3. Camel Records produces records according to $Q = 4L - 0.15L^2$. If labor costs \$5 and records sell for \$2, the optimal quantity of labor is

A. 0.
B. 2.
C. 10.
D. 5.
E. 17.

Note: This is a short-run profit maximization problem; capital is fixed in the short run, but you can alter the amount of the labor input. The key is to use the MRP = ME equation in chapter 6 (see pp. 183-185 for the equation (6.8) and related discussion). This is also provides the logical framework for solving Class Problem 6.1. Therefore, to maximize profit, the firm should utilize the amount of input L where the marginal revenue product equals the marginal expenditure:

$MRP_L = \frac{dTR}{dQ}\frac{dQ}{dL} = \frac{dTC}{dQ}\frac{dQ}{dL} = ME_L$. Here, MR = \$2 and $dQ/dL = 4 - .3L$, so

$MRP_L = 2(4 - .3L) = 5 \Rightarrow L = 5$.

4. If output is produced according to $Q = 4L + 6K$ (L is the quantity of labor input and K is the quantity of capital input), the price of K is \$12, and the price of L is \$6, then the cost minimizing combination of K and L capable of producing 60 units of output is

A. $L = 5$ and $K = 6.66$.
B. $L = 7.5$ and $K = 5$.
C. $L = 6$ and $K = 6$.
D. $L = 0$ and $K = 10$.
E. $L = 15$ and $K = 0$.

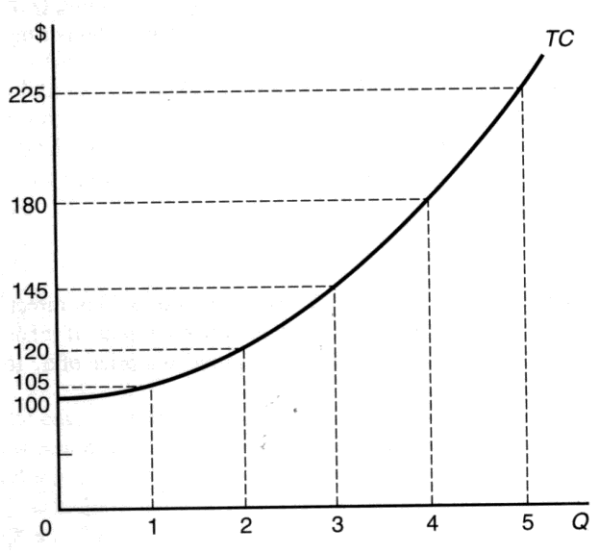
Note: The optimal combination of capital and labor typically occurs at values for K and L where the ratios of marginal products to prices for labor and capital are equal to each other (see equation (4.8), p. 113 in the textbook). This occurs because of the *law of diminishing returns*; i.e., if we increase one input at a constant rate while holding the other input constant, then output increases at a decreasing rate; i.e., the marginal product of each input declines as more of that input is added, other things equal. However, in this case, this law clearly *does not* apply. In fact, there is a law of *constant returns* at play with this production function. An important consequence is that the ratios of marginal products to prices for labor and capital are *never* equal to each other; specifically, $MP(L)/P(L) = 4/6$ for all L, whereas $MP(K)/P(K) = 6/12$ for all K. Therefore, it is optimal to forego any use of capital whatsoever and rely solely upon labor. Thus the cost minimizing combination of K and L capable of producing 60 units of output is $K = 0$ and $L = 15$.

5. Economies of scale are said to exist whenever

A. the learning curve is upward sloping.
B. increases in output bring about higher output.
C. increases in output bring about higher input prices.
D. the elasticity of total cost with respect to output is greater than 1.
E. the long-run average cost curve is downward sloping.

Note: See Figure 5.6 on page 145, and the related discussion about this topic on pp. 144-146 of the textbook.

Use the following information to answer questions 6-8. The diagram below represents the short-run total cost function for the Fidget Company, which produces widgets.



6. The equation for the total cost function represented in the diagram is

A. $TC = 100$.
B. $TC = 10Q$.
C. $TC = 5Q^2$.
D. $TC = 100Q$.
E. $TC = 100 + 5Q^2$.

Note: The intercept is at 100, so this is fixed cost. Note also that when $Q = (1, 2, 3, 4, 5)$, $\Delta TC = (5, 20, 45, 80, 125)$. Therefore, $TC = 100 + 5Q^2$.

7. The equation for the marginal cost function represented in the diagram is

A. $MC = 100$.
B. $MC = 10Q$.
C. $MC = 10Q^2$.
D. $MC = 100Q$.
E. $MC = 100 + 5Q^2$.

Note: Since $TC = 100 + 5Q^2$, $MC = 10Q$!

8. The fixed costs represented in the diagram are

A. $FC = \$100$.
B. $FC = 10Q$.
C. $FC = 5Q^2$.
D. $FC = \$500$.

Note: The intercept is at 100, so this is fixed cost.

9. A representative firm with short-run total cost given by $TC = 50 + 2q + 2q^2$ operates in a competitive industry where the short-run market demand and supply curves are given by $Q_D = 1{,}410 - 40P$ and $Q_S = -390 + 20P$. Its short-run profit maximizing level of output is

A. 0 units.
B. 1 unit.
C. 2 units.
D. 5 units.
E. 7 units.

Note: Setting $Q_D = Q_S \Rightarrow 1{,}410 - 40P = -390 + 20P \Rightarrow P = 30$. In a short-run competitive industry equilibrium $P = MC$; $MC = 2 + 4q$; $\therefore$ $2 + 4q = 30 \Rightarrow$ short-run profit maximizing level of output = 7 units.

10. If a representative firm with long-run total cost given by $TC = 50 + 2q + 2q^2$ operates in a competitive industry where the short-run market demand and supply curves are given by $Q_D = 1{,}410 - 40P$ and $Q_S = -390 + 20P$, its long-run profit maximizing level of output is

A. 0 units.
B. 1 unit.
C. 2 units.
D. 5 units.
E. 7 units.

Note: This can be solved in two ways: 1) In the long run, the competitive firm minimizes average total cost (ATC), where $ATC = TC/Q = ATC = 50q^{-1} + 2 + 2q$; therefore, $dATC/dq = -50q^{-2} + 2 = 0 \Rightarrow 50 = 2q^2 \Rightarrow q = 5$ units, or 2) Set $MC = ATC$; $MC = 2 + 4q = 50q^{-1} + 2 + 2q \Rightarrow q = 5$ units.

11. If a representative firm with long-run total cost given by $TC = 50 + 2q + 2q^2$ operates in a competitive industry where the market demand is given by $Q_D = 1{,}410 - 40P$, the long-run equilibrium output of the industry will be

A. 490 units.
B. 530 units.
C. 570 units.
D. 610 units.
E. 650 units.

Note: Since $q = 5$ at the firm level in the long run, this implies that the long-run equilibrium price for the industry will be $P = MC = 2 + 4q = 2 + 4(5) =$ \$22. Thus, in a competitive long-run equilibrium, $P = MC = 2 + 4q = 2 + 4(5) =$ \$22 . Since $P =$ \$22, $Q_D = 1{,}410 - 40(22) = 530$ units.

12. In the model of monopolistic competition, firms produce a

A. standardized product with considerable control over price.
B. differentiated product with considerable control over price.
C. standardized product with no control over price.
D. differentiated product with no control over price.
E. differentiated product with some control over price.

Note: See Table 6.1, p. 171 for a list of characteristics of perfect competition, monopolistic competition, oligopoly, and monopoly.

13. If a monopolist faces a constant elasticity of demand curve given by $Q = 400P^{-2}$ and has total costs given by $TC = 0.625Q^2$, its profit maximizing level of output is

A. 0.
B. 2.
C. 4.
D. 6.
E. 8.

Note: $\eta = (dQ/dP)(P/Q) = -2(400)P^{-3}P^1400^{-1}P^2 = -2$. For the monopolist, $P = MC/[1+(1/\eta)]$. Here, $MC = 1.25Q$. Therefore, $P = 1.25Q/[1+(1/(-2)] = 2.5Q$. Therefore, $Q = 400P^{-2} = 400(2.5Q)^{-2} \Rightarrow Q^3 = 400/2.5^2 \Rightarrow Q = 4$.

14. If Gulfstream and Bombardier, both producers of upscale jet airplanes, were to collude rather than compete, consumers could expect

A. higher prices and lower quantities offered for sale.
B. lower prices and lower quantities offered for sale.
C. higher prices and higher quantities offered for sale.
D. each firm to cheat on the cartel agreement.
E. one firm to emerge as the price leader in the oligopoly.

Note: As we showed in the fifth lecture, a duopoly with collusion is essentially the same as a 2-plant monopoly. Such a setup is guaranteed to result in higher prices and lower quantities available for sale than any other possible scenario for a duopoly.

15. Refer to the payoff matrix below. Which of the following is a Nash equilibrium?

		Company *B*: Strategy 1	Company *B*: Strategy 2
Company *A*: Strategy 1		Company *A*'s Profit: \$8 million; Company *B*'s Profit: \$7 million	Company *A*'s Profit: \$9 million; Company *B*'s Profit: \$8 million
Company *A*: Strategy 2		Company *A*'s Profit: \$6 million; Company *B*'s Profit: \$10 million	Company *A*'s Profit: \$8 million; Company *B*'s Profit: \$8 million

A. Company A chooses Strategy 1 and Company B chooses Strategy 1.
B. Company A chooses Strategy 1 and Company B chooses Strategy 2.
C. Company A chooses Strategy 2 and Company B chooses Strategy 2.
D. Company A chooses Strategy 2 and Company B chooses Strategy 1.

Note: For Company A, Strategy 1 strictly dominates Strategy 2, so Company A will choose Strategy 1 no matter what Company B chooses. Company B does not have a dominant strategy, but its "best response" to Company A playing Strategy 1 is to play Strategy 2. Therefore, response B describes a Nash equilibrium.

16. A player in a game theoretic model is:
A. anyone working for a firm that is operating strategically
B. a decision-making entity at a firm involved in a strategic game
C. a firm that is operating as a perfect competitor
D. a monopolist who produces a unique product with no close substitutes
E. a stockholder at a firm involved in a strategic game

17. Game theory is useful for understanding oligopoly behavior because:
   A. there are so many firms in an oligopoly that all are price takers
   B. firms must differentiate their products if they are to remain in business
   C. <u>firms recognize that because there are only a few firms mutual interdependence is important</u>
   D. without it firms would not be able to maintain cartel agreements
   E. it allows firms to develop greater monopoly power

18. If a firm has a dominant strategy:
   A. its optimal strategy depends on the play of rivals
   B. its optimal strategy is always the same, even if payoffs change
   C. it is determined by the behavior of only one key rival
   D. it receives the same profits regardless of the strategy of rivals
   E. <u>its optimal strategy is independent of the play of rivals</u>

19. I. M. Hogg is running for office with 500,000 sure voters. To add voters, he wants to choose n, the number of negative campaign ads to run, where $0 \le n \le 4$. The ads will backfire with probability $0.2n$ and give him no extra votes. Otherwise, the ads will not backfire (with probability $(1 - 0.2n)$) and give him $100{,}000 + 40{,}000n$ extra votes. So $n = 0$ implies a total of 600,000 votes. Assuming that I. M. Hogg is *risk neutral*, he should choose $n =$

   A. 0.
   B. <u>1.</u>
   C. 2.
   D. 3.
   E. 4.

   <u>Note:</u> Since I. M. Hogg is risk neutral, his objective is to select the number of negative campaign ads that maximize the expected number of voters. Therefore, $E(\text{voters}) = 500{,}000 + [100{,}000+40{,}000n](1-.2n) = 600{,}000 + 20{,}000n - 8{,}000n^2$. Thus, $dE(\text{voters})/dn = 20{,}000 - 16{,}000n = 0 \Rightarrow n = 20{,}000/16{,}000 = 1.25$. Since only integer values are possible, the optimal number of negative campaign ads to run is 1.

20. Trope Oil Company is considering drilling an exploratory well. The symbol P is the chance of a successful well, R is the revenue from a successful well, L is the price previously paid for the land, and C is the cost of drilling. The well will be either successful or dry. A company that is risk neutral should drill if

   A. <u>$PR > C$.</u>
   B. $PR > C + L$.
   C. $P(R - C) > 0$.
   D. $P(R - C - L) > 0$.
   E. $P(R - C) > L$.

   <u>Note:</u> Since Trope is risk neutral, its objective is to maximize expected profit. L represents a sunk cost, so we ignore L entirely, since the issue here is whether to drill, given that this investment has already been made. The expected value of the incremental profit there is $E(\pi) = PR - C$. Therefore, Trope should drill if $PR > C$.

21. Harold is indifferent between $2,500 for sure and a bet with a 60 percent chance of $2,400 and a 40 percent chance of $2,600. Harold is

   A. risk averse.
   B. <u>risk loving.</u>
   C. risk neutral.
   D. a profit maximizer.
   E. irrational.

   <u>Note:</u> Here, $E(W) = .6(2{,}400) + .4(2{,}600) = \$2{,}480$. Since expected wealth ($2,480) is less than the certainty equivalent of wealth ($2,500), this implies that Harold is *risk loving*. If Harold were risk neutral, he would be indifferent between $2,480 for sure and this bet. The fact that he is willing to pay more than $2,480 implies risk-loving behavior.

22. A risk-averse person has a utility function that, with wealth on the horizontal axis and utility on the vertical axis, as wealth increases,

A. is a horizontal line.
B. is a vertical line.
C. has constant, positive slope.
D. is increasing at a decreasing rate.
E. is increasing at an increasing rate.

Note: As we discussed in class, if one is risk averse, then one has *diminishing marginal utility*. Diminishing marginal utility has the property of utility increasing at a decreasing rate as wealth increases.

23. The principal-agent problem occurs as a result of

A. the absence of a contract between managers and owners.
B. the separation of ownership from control.
C. the difficulty of identifying the principal agent with whom to negotiate.
D. competition between managers at various levels.
E. none of the above.

24. Consider Mr. Ed, who purchases an insurance policy on a thoroughbred that he has acquired. He then proceeds to run the horse even though the horse has tendinitis. This is an example of:

A. an adverse-selection problem
B. a moral-hazard problem
C. coinsurance
D. signaling
E. all the above

25. Donald has a beach house on the Outer Banks of North Carolina that was severely damaged in the most recent hurricane to strike the coast. Due to beach erosion, he has rebuilt twice in the past 20 years. He is intent on rebuilding, confident that government-provided flood insurance will cover his expenses. This is an example of:

A. how market-based solutions to problems are superior to government solutions
B. moral hazard
C. adverse selection
D. asset substitution
E. none of the above

Use the following information to answer questions 26-30.

Suppose the Ajax Insurance Company provides insurance for skydivers, whose wealth before diving is $400. An accident will leave divers with a wealth of $100. The company divides the divers into two classes, safe (probability of an accident = .2) and unsafe (probability of an accident = .5). The utility of wealth for all divers is given by the function: $U(w) = w^{.5}$.

26. Given this information, the divers are

A. risk averse.
B. risk seeking.
C. risk neutral.
D. indifferent to risk.
E. risk averse, seeking, or neutral; we cannot tell from this information.

Note: Since $U(w) = w^{.5}$ has the diminishing marginal utility property, this implies that divers are risk averse.

27. The expected utility of no insurance for the safe diver is

A. 15.
B. 17.3.
C. 18.
D. 18.3.

Note: Here, $E(U(W)) = .2U(100) + .8U(400) = .2(10) + .8(20) = 18$.

28. If the insurance premium is $100,

A. both types of divers buy insurance.
B. neither type of diver buys insurance.
C. only the safe divers buy insurance.
D. only the unsafe divers buy insurance.

Note: The actuarially fair insurance price for safe divers is .2(300) = $60, and for unsafe divers, it is .5(300) = $150. Therefore, a $100 insurance premium *exceeds* the actuarially fair price for safe divers by $40, whereas it is $50 *less* than the actuarially fair price for unsafe divers. If safe or unsafe divers bought insurance, their expected utility would be $U(300) = 17.32$; since the expected utility of no insurance for safe divers is 18, they prefer to go without insurance. However, since $E(U(W)) = .5U(100) + .5U(400) = .5(10) + .5(20) = 15$ for unsafe divers, they prefer to buy insurance. Thus, only the unsafe divers buy insurance.

29 If the insurance premium is $50,

A. both types of divers buy insurance.
B. neither type of diver buys insurance.
C. only the safe divers buy insurance.
D. only the unsafe divers buy insurance.

Note: Since $50 is *less than* the actuarially fair prices of coverage for both safe and unsafe divers, the Bernoulli principle implies that both types of divers buy insurance. However, in this case the insurer would lose money on both safe and unsafe divers; the expected profit per safe diver is -$10, whereas the expected profit per unsafe diver is -$100.

30. If only the unsafe divers buy insurance and the premium is $100, the insurance company will expect to

A. earn profits of $50 per unsafe diver.
B. break even.
C. earn losses of $50 per unsafe diver.
D. earn losses of $200 per unsafe diver.

Note: Since the expected cost of insuring each unsafe diver is $150, the insurer will expect to earn losses of $50 per unsafe diver.