

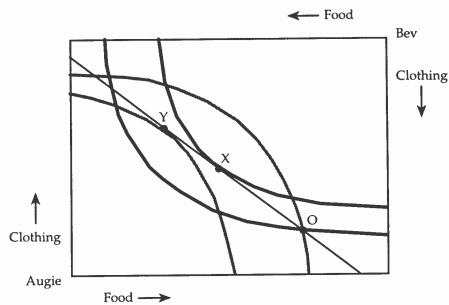
The following exam consists of 39 questions on 6 pages. Please check to see that you have all parts of the exam before beginning. The exam is worth 76 points. You have 50 minutes to complete the exam. *Time may be a factor, so do not get stuck on any question.* You may use a calculator. Good Luck.

A. Multiple Choice (11 questions, 20 points MISS ONE FOR FREE)

(2 points each)

- Suppose all firms in an industry are identical. In the long run, entry and exit guarantee that all firms will have zero
 - marginal cost.
 - average cost.
 - economic profit.***
 - accounting profit.
- If the marginal rate of technical substitution of labor for capital ($MRTS_{LK}$) is *less* than the relative price of labor in terms of capital (P_L/P_K), then
 - the firm's long-run average cost curve is rising.
 - the firm is producing its output at the least possible cost, but the firm should reduce its output level to increase its profits.
 - the firm has increased its output level beyond the point of diminishing marginal returns.
 - the firm needs to use more capital and less labor to reach its expansion path.***
- Second-degree price discrimination generally takes the form of
 - special prices for students and seniors.
 - membership clubs.
 - quantity discounts.***
 - "extras" like free delivery and free customer service.

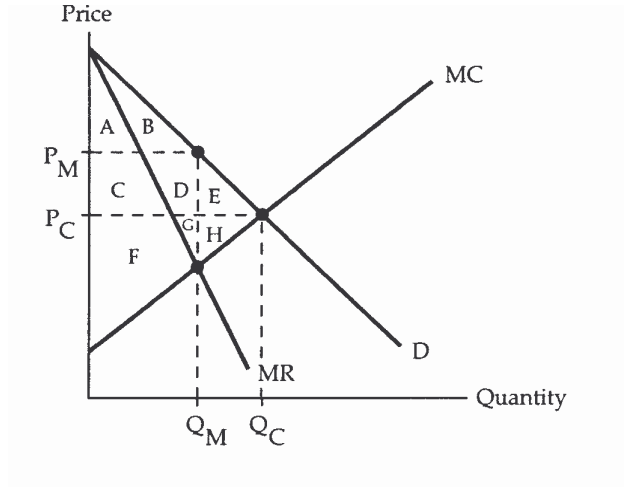
The accompanying diagram shows an Edgeworth box economy. The initial endowment is point O. At current relative prices, Augie chooses point X and Bev chooses point Y.



- Based on the situation shown in the diagram, we can conclude that
 - Augie and Bev have reached a competitive equilibrium.
 - the relative price of food must rise to clear the market.***
 - the relative price of food must fall to clear the market.
 - there is a shortage of clothing and a surplus of food.
- In an Edgeworth box, points along the contract curve represent
 - the initial endowment points.
 - allocations that both consumers prefer to the initial endowment.
 - competitive equilibria.
 - Pareto-optimal allocations of goods.***
- In an Edgeworth box, points within the region of mutual advantage represent allocations that
 - can be achieved by a competitive market.
 - both consumers prefer to the initial endowment.***
 - exhaust the potential gains from trade.
 - are Pareto optimal.

Use the following information for questions 7 through 10.

P_C and Q_C are the equilibrium price and quantity if the firm behaves competitively, and P_M and Q_M are the equilibrium price and quantity if the firm is a simple monopoly.



7. What area represents the producer's surplus earned in the competitive equilibrium?
 - a. ABCDE
 - b. CDFG
 - c. AB
 - d. **FGH**

8. If the firm switched to the simple monopoly equilibrium (Q_M), how much deadweight loss would be created?
 - a. DEGH
 - b. **EH**
 - c. none
 - d. CDE

9. Suppose the firm could perfectly price discriminate, how much *additional* producer surplus would producers earn when compared to their producer surplus under the simple monopolist scenario?
 - a. CD
 - b. CDE
 - c. **ABEH**
 - d. EH

10. How much deadweight loss is created if the firm perfectly price discriminates (versus the competitive equilibrium)?
 - a. DEGH
 - b. EH
 - c. **none**
 - d. CDE

11. When a firm with market power practices third-degree price discrimination, it charges the highest price to the group that
 - a. has the most elastic demand.
 - b. **has the most inelastic demand.**
 - c. purchases the highest quantity.
 - d. purchases the lowest quantity.

B. 8 points. Use the following information for questions 12 through 15.

(2 points each)

A firm has the production function $Q = L^4 K^3$. Using calculus, the $MPL = 4L^3 K^3$, and the $MPK = 3L^4 K^2$. The wage rate is \$5 per hour and the rental rate is \$15 per hour. The firm decides to spend \$140 on its inputs.

12. What is the optimal level of K? 4

13. What is the optimal level of L? 16

14. What is the firm's total level of production? $Q=(16^4)*(4^3)=4,194,304$

15. Does this production function $Q = L^4 K^3$ exhibit increasing, decreasing, or constant returns to scale? (Circle One)

SHOW YOUR WORK HERE:

$$MPL/MPK = (P_L/P_K) = 4K/3L = 5/15 \Rightarrow 15L = 60K \Rightarrow L = 4K \text{ (eqn 1)}$$

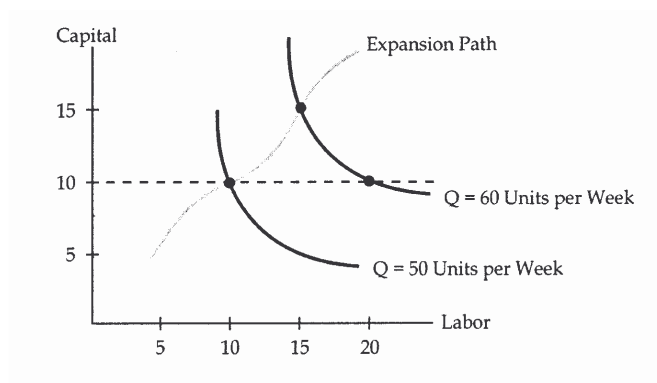
$$140 = 5L + 15K \text{ (eqn 2)}$$

$$\text{Plug (1) into (2) to get } 140 = 5(4K) + 15K \Rightarrow 140 = 35K \Rightarrow K=4, L=16$$

C. 10 points. Use the following information for questions 16 through 20.

(2 points each)

Refer to the diagram below. The wage rate (P_L) is assumed to be \$25 per hour, the capital rental rate (P_K) is assumed to be \$15 per hour, and capital is assumed to be fixed in the short run at 10 units.



16. What is the *short-run total cost* of producing 60 units of output per week? $(25*20)+(15*10)=650$

17. What is the *short-run average cost* of producing 60 units of output per week? $650/60 = 10.83$

18. What is *long-run total cost* of producing 60 units of output per week? $(25*15)+(15*15)=600$

19. What is the *long-run average cost* of producing 60 units of output per week? $600/60=10$

20. If K and L both increased from 10 to 20 units and the firm was experiencing constant returns to scale, along the firm's expansion path, the corresponding new level of output would be 100 units per week.

SHOW YOUR WORK HERE:

(20): K&L are increased by 100%, so for constant returns to scale, output has to be increased by 100% (from 50 to 100)

D. 20 Points. Use the following information for questions 21 through 30.
(2 points each)

Widgets are provided by a competitive constant cost industry. The following charts show the industry-wide demand curve and the marginal & total costs curve of a typical firm. The three blank columns are to be used to help answer the questions below. Hint: in order to answer the full problem, you will need to fill in all three scrap space columns.

Firm Costs			Scrap		Industry Demand		Scrap
q	MC	TC	ATC	Supply= 100*q	Price	Q	New P
1	\$5	105	105	100	\$5	900	-15
2	15	120	60	200	15	800	-5
3	25	145	48.3	300	25	700	5
4	35	180	45	400	35	600	15
5	45	225	45	500	45	500	25
6	55	280	46.66	600	55	400	35
7	65	345	49.28	700	65	300	45
8	75	420	52.5	800	75	200	55

Suppose the industry is initially in long-run equilibrium.

21. What is the initial equilibrium price of a widget (P) ? $P=ATC=MC=\$45$

22. What is each firm's output (q) ? 5

23. How many firms are in the industry? $500/5=100$

*Now you can fill in industry supply= 100*q*

*** Now suppose the government imposes a SALES tax of \$20 per widget. ***

Sales tax lowers demand- so you need to SUBTRACT tax from price to get your new demand curve

SHORT RUN:

24. In the short run, what is the new price of widgets (P)? \$35

Find where Qd new (new industry demand)= Qs (industry supply). This happens where P=35

25. In the short run, what is the quantity of widgets produced by each firm (q)? at p=35, each firm produces 4

26. In the short run, how many firms are producing widgets? 100- this can't change in SR! SR is defined by no entry or exit, so the number of firms has to stay the same!!

27. In the short run, how much profit (or negative profit) are the firms earning? profit = q(p-atc) = 4(35-45) = -\$40

LONG RUN:

28. In the long run, what is the new price of widgets (P)? \$45

Note- a change in demand does affect the firm's costs curves, so the condition from the first part of the problem, P=ATC=MC=\$45, still holds. So, in the LR, the price has to go back to \$45.

29. In the long run, what is the quantity of widgets produced by each firm (q)? likewise, q=5 again

30. In the long run, how many firms are producing widgets? 60

Now, we have to find the Qd associated with the new price of \$45 (on the new industry demand). At \$45, Qd= 300. Each firm produces 5, so there are now 300/5=60 firms producing widgets.

E. 10 Points. Use the following information for questions 31 through 35.
(2 points each)

Suppose cameras are produced by Japanese manufacturers and sold to Americans. There are no American producers. The demand and supply curves of cameras are given by the following equations:

U.S. Demand equation: $Q = -120P + 1050$ ($P = 8.75 - 1/120 * Q$)

Japanese Supply equation: $Q = 90P$ ($P = 1/90 * Q$)

Given these equations, equilibrium p and q are as follows: $p^* = 5$ and $Q^* = 480$.

*******Note- Q^* should have been 450- this was a typo. But, we'll do the problem assuming the 480 is the correct eq Q !*******

31. What is consumer surplus? $CS = ([8.75 \text{ (demand intercept)} - 5 \text{ (price)}] * 480 \text{ (quantity)})/2 = 900$ _____

32. Assuming we care only about the welfare of America, what is social welfare under this initial scenario? **900 - we don't care about Japan's PS!**_____

A government official recommends that a \$7 per unit tariff be imposed on imports from Japan and the resulting revenues be redistributed to Americans. With this \$7 tariff, the new quantity (Q^*) would be 90 units and market price (p^*) would be \$8.

33. What is the post-tariff level of consumer surplus? $CS = ([8.75 \text{ (demand intercept)} - 8 \text{ (price)}] * 90(q))/2 = 33.75$

34. How much tariff revenue is created? $tariff = \$7 \text{ per unit} * 90 \text{ units} = \630 _____

35. According to the efficiency criterion (and assuming we care only about the welfare of Americans) should we reject or accept this proposed tariff? Why? _____ **We should reject the tariff because social welfare of Americans without the tariff (900) is larger than total American social welfare with the tariff (630+33.75) = 663.75.**_____

SHOW YOUR WORK HERE:

F. 8 Points. Use the following information for questions 36 through 39.

(2 points each)

The following questions refer to the game matrix below.

Player A can play the strategies UP and DOWN.

Player B can play the strategies LEFT and RIGHT.

NOTE: Payoffs are in the form (A, B) where the first payoff is in square is the payoff for player A and the second payoff is for player B.

		Player B	
		Left	Right
Player A	Up	(6, 6)	(2, 7)
	Down	(2, 2)	(5, 3)

36. List any Nash Equilibrium for the game (A, B): _(down, right)

37. List any Pareto Optima (A, B). _(up, left) & (up, right)

38. Does any player have a dominant strategy? If so, list the (Player, strategy) : _(B, right)

39. Suppose player A announces its strategy first. What is the Stackelburg equilibrium (A, B)? _(Down, right)