

The following exam consists of 90 questions on 9 pages. Please check to see that you have all parts of the exam before beginning. The exam is worth 150 points. You have 3 hours 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. 34 points. Multiple Choice (35 questions, 34 points, miss one for free)

1. The original price of a movie ticket is \$4.00. At this price, one group of movie patrons (group A) goes to see 8 movies a month, while another group (group B) goes to see 3 movies a month. The theater decides to increase its price by \$1 so that now a ticket costs \$5. When it does, it finds that group A decreases its monthly viewing to 7 movies, while group B decreases its monthly viewing to 2 movies a month. If the theater can practice third degree price discrimination, it should
 - a. Charge group A a higher price, because group A's price elasticity of demand is less elastic.
 - b. Charge group A a higher price, because group A's price elasticity of demand is more elastic.
 - c. Charge group B a higher price, because group B's price elasticity of demand is less elastic.
 - d. Charge group B a higher price, because group B's price elasticity of demand is more elastic.

2. A cartel member has the incentive to cheat on the cartel agreement because
 - a. it fears that other members may also cheat on the agreement.
 - b. the cartel prevents the member from charging the monopoly price.
 - c. undercutting the cartel price will increase the cartel member's profits.
 - d. the cartel outcome is not Pareto optimal for the cartel members.

3. The key defining feature of oligopoly, in addition to firms' market power, is
 - a. collusion.
 - b. free entry and exit.
 - c. firms take rivals' actions into account.
 - d. the Prisoner's Dilemma.

4. Firms in monopolistic competition resemble monopolies in that both types of firms
 - a. earn positive economic profits in the long run.
 - b. charge prices higher than their marginal costs.
 - c. possess barriers to entry that keep potential rivals out of the market.
 - d. produce their output so that their average cost is minimized.

5. In what way is monopolistic competition superior to perfect competition?
 - a. The cost of producing the industry's output is lower in monopolistic competition.
 - b. Consumers benefit from having differentiated products instead of identical products.
 - c. Long-run profits are higher in monopolistic competition than in pure competition.
 - d. In monopolistic competition, firms can fully exploit any existing economies of scale.

6. According to Coase analysis, when are private and social costs the same?
 - a. Always.
 - b. When there are no transactions costs.
 - c. When property rights are clearly defined.
 - d. Never.

7. According to the Weak Coase Theorem, in the absence of transactions costs, the assignment of property rights has no effect on
 - a. damages paid by liable parties.
 - b. the distribution of income.
 - c. the allocation of resources.
 - d. economic efficiency.

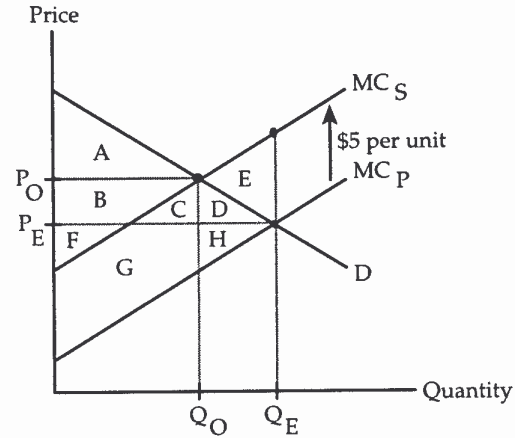
8. Free-riding is a problem associated with
 - a. nonrivalrous goods.
 - b. nonexclusive goods.
 - c. both nonrivalrous and nonexclusive goods.
 - d. neither nonrivalrous nor nonexclusive goods.

9. A market failure occurs when
- Shortages or surpluses of some good cannot be eliminated.
 - A private market cannot provide a good in socially efficient quantities.
 - Consumers' surplus falls to zero.
 - Property is privately owned and people behave competitively.

Questions 10-13 refer to the accompanying diagram, which shows the effects of a negative externality created by an industry's production. The equilibrium quantity in the absence of any attempt to internalize the externality is Q_E .

10. Suppose there is no attempt to internalize the externality. Pigovian analysis indicates that the externality creates a deadweight loss equal to
- area C + D + E + G + H.
 - area D + E + H.
 - area C + D + G + H.
 - area E.

11. According to a Pigovian analysis of this externality, when a tax of \$5 per unit is imposed on the firms in this industry, the external costs created by the firms' production will equal
- area C + D + E + G + H.
 - area C + D + G + H.
 - area C + G.
 - zero.



12. Suppose there are no transactions costs. Also suppose the externality is internalized when the damaged parties offer producers a bribe of \$5 per unit to reduce their production. Coasian analysis indicates that social gain in this situation will equal
- area A + B + F.
 - area A + B + F - E.
 - area A + B + C + D + F + G + H.
 - area A + B + C + F + G.

13. According to Pigou, the socially optimal quantity
- is Q_O
 - is Q_E

14. Why do private markets tend to undersupply non-rivalrous goods?
- Because free riders will refuse to pay for these goods.
 - Because the tragedy of the commons will reduce their value to zero.
 - Because people have an incentive to understate their preferences for these goods.
 - Because the efficient price for these goods is zero.

15. Private markets tend to undersupply non-excludable goods because of
- Individuals' incentives to be untruthful.
 - Overcrowding.
 - Free riding.
 - Dissipated rents.

16. An uncrowded city park falls under square ____ while a movie theater falls under square ____

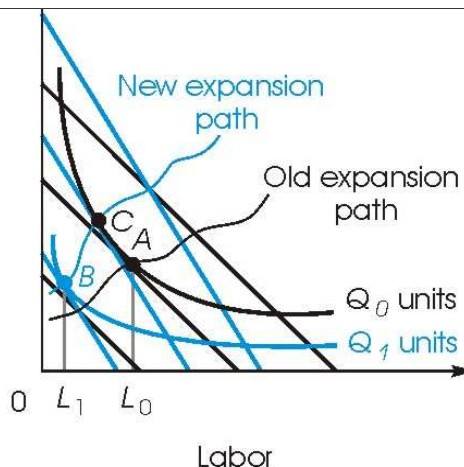
	Non Excludable	Excludable
Non Rival	A	C
Rival	B	D

- A;B
- D;C
- A;C
- D;B
- A;D

17. A profit maximizing firm in any type of market for its output would hire the quantity of labor at which
- the marginal cost of output is equal to the marginal revenue product of labor, where MRP is sloping downward.
 - the wage rate is equal to marginal revenue product, where MRP is downward sloping.
 - the wage rate is equal to marginal revenue product, where MRP is still sloping upward.
 - the difference between the wage rate and marginal revenue product is greatest.
18. An increase in the price of labor will, in the short run, cause a competitive firm's
- marginal cost to increase, the quantity it sells to decrease and therefore reduce the quantity demand of labor.
 - price of output to increase, leaving the demand for labor unchanged.
 - marginal revenue product of labor to decrease and therefore reduce demand for labor.
 - marginal revenue product of labor to increase and therefore increase demand for labor.
19. If labor and capital are complements in production, then an increase in the amount of capital will
- reduce the firm's demand for labor.
 - raise the firm's marginal cost of production.
 - cause the scale effect to outweigh the substitution effect.
 - increase labor's marginal product.
20. Which of the following would cause the firm's short-run demand curve for labor to shift to the right?
- A decrease in the wage rate.
 - An increase in the price of the firm's product.
 - A decrease in the rental rate paid to capital.
 - A fall in the amount of complementary capital available.

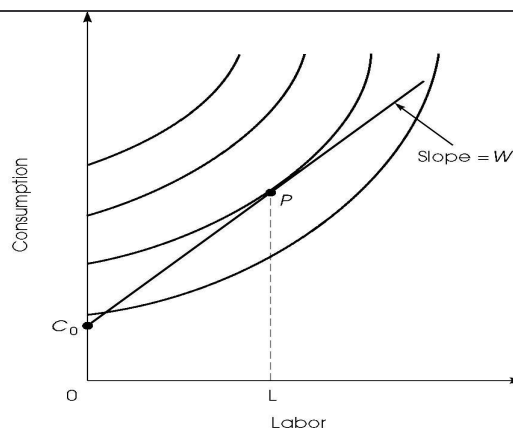
21. The figure shows the effects of a wage _____. The firm starts at point A and ultimately ends up at point B. Point C is an interim point that illustrates certain effects. The movement from A to C is the _____ effect while the movement from C to B is the _____ effect.

- Increase ; substitution ; income
- Increase ; scale ; substitution
- Increase ; substitution ; scale
- Decrease ; scale ; substitution
- Decrease ; substitution ; scale



22. Looking at the indifference curves in the figure to the right, utility increases as we move

- Along indifference curves to the northeast
- Along indifference curves to the southwest
- Across indifference curves to the southeast
- Across indifference curves to the northwest



23. In the indifference curve-budget line model of labor supply, the vertical intercept of the budget line represents
- the worker's nonlabor income.
 - the wage rate paid to the worker.
 - the number of leisure hours enjoyed by the worker.
 - the number of hours of labor that the worker supplies.
24. If providing more labor and consuming less leisure would make a worker better off, then the wage rate must be greater than the worker's
- marginal revenue product.
 - marginal value of leisure.
 - nonlabor income.
 - human capital.
25. When does a higher wage rate lead to an increase in the number of work hours supplied by laborers?
- Always.
 - When the substitution effect outweighs the income effect.
 - When the income effect outweighs the substitution effect.
 - Never.
26. Which of the following situations will shift a worker's labor supply curve to the left?
- Higher nonlabor income.
 - A lower wage rate, assuming the substitution effect dominates the income effect.
 - New machinery that substitutes for labor and lowers its marginal product.
 - A decrease in the marginal value of leisure.
27. When would a rise in labor's marginal productivity lead to a leftward shift in workers' labor *supply* curve?
- When workers are employed by a monopsony.
 - When workers earn more nonlabor income from their capital.
 - When workers engage in intertemporal substitution.
 - When workers reduce their investment in human capital.
28. A worker who brings both labor and human capital to her job earns
- both the wage rate for her labor and a share in the employer's profits.
 - both the wage rate for her labor and a market rate of return on her skills.
 - the going wage rate for her labor, the benefits of her capital accrue to her employer's owners.
 - both the going wage rate for her labor and annual bonuses based on the level of profits and her skills.
29. The relative price of an apple today in terms of apples tomorrow is given by
- $1-r$.
 - r .
 - $1+r$
 - $1/(1+r)$.
30. When a bond is sold at a discount, the term discount refers to
- the rate of interest.
 - the face value of the bond minus its current price.
 - its current price.
 - its face value multiplied by $1+r$.
31. When the interest rate is 7.5%, what is the present value of a perpetuity paying \$50 a year forever?
- \$375.00
 - \$465.11
 - \$537.50
 - \$666.67

The following tables show the demand and supply for grapes. Demand is uncertain, with D_1 and D_2 each occurring 50% of the time. Suppliers must base their decisions on the expected price and must sell all grapes they bring at the going market price.

Demand D_1		Demand D_2		Supply	
Quantity	Price	Quantity	Price	Quantity	Price
5 lb.	\$3.50/lb.	25 lb.	\$3.50/lb.	10 lb.	\$1.00/lb.
10	3.00	30	3.00	15	1.50
15	2.50	35	2.50	20	2.00
20	2.00	40	2.00	25	2.50
25	1.50	45	1.50	30	3.00
30	1.00	50	1.00	35	3.50

32. If suppliers have rational expectations, what will be their expected price of grapes?

- 1.00
- 1.50
- 2.00
- 2.50
- 3.00

33. Give the market price is D_2 occurs.

- 1.00
- 1.50
- 2.00
- 2.50
- 3.00

34. What type(s) of individual will always choose a risk-free basket when offered a bet at fair odds?

- A risk-neutral individual
- A risk-averse individual
- A risk-preferring individual
- Risk-neutral and risk-averse individuals

35. When a person is risk-preferring, his indifference curves are

- convex.
- concave.
- linear.
- upward sloping.

B. 6 points. Bond Pricing (3 points each)

36. Calculate the present value of a bond that pays nothing tomorrow, \$40 the next day, nothing on the 3rd day, nothing on the 4th day, and \$100 the 5th day. The daily interest rate is 10%. _____

37. A perpetuity is selling for \$20,000 when the interest rate is 4%. What must the expected annual payment be? _____

C. 10 points. Use the following information for questions 38 through 41. (2 points each)

The following questions refer to the game matrix below. Payoffs are in the form (A,B)

Player A can play the strategies UP, MIDDLE, and DOWN.

Player B can play the strategies LEFT, MIDDLE and RIGHT.

		B		
		L	M	R
A	U	10,5	6,6	2,7
	M	9,1	2,2	5,3
	D	8,2	3,3	3,4

38. List any Nash Equilibrium for the game (A,B): _____
39. List any Pareto optima for this game (A,B): _____ Draw the diagram of Pareto Optimum above.
40. List any dominant strategy (Player, strategy) : _____
41. What is the outcome if the game is played sequentially with player A going first (A,B)? _____
42. What is the outcome if the game is played sequentially with player B going first (A,B)? _____

D. 30 points. Use the following information for questions 43 through 56. (2 points each)

The demand equation is given by $Q = -200P + 2400$ [$P = 12 - 1/200 * Q$]

The supply equation is given by $Q = 400P$ [$P = 1/400 * Q$]

43. What is the equilibrium price? _____
44. What is the equilibrium quantity? _____
45. What is consumer surplus at this price and quantity? _____
46. What is social welfare at this price and quantity? _____
- *** For questions 47 through 55 assume the government institutes a sales tax of 3\$ per unit
47. What is the new price paid by consumers? _____
48. What is the new equilibrium quantity? _____
49. What is the Total Revenue received by producers? _____
50. How much tax revenue is collected by the government? _____
51. With this \$3 sales tax, what percentage of the tax was paid by consumers? _____
52. If the demand curve had been more elastic, would your answer to 51 increase or decrease? _____
53. With this \$3 tax, what is the new consumer surplus? _____
54. With this \$3 tax, what is producer surplus? _____
55. With this \$3 tax, how much deadweight loss is created? _____
56. When the government institutes an excise tax, the resulting market price goes _____ and the quantity goes _____.

E. 16 points. Use the following information for questions 57 through 64. (2 points each)

$U = x \cdot y^3$ where x is the amount of good x consumed, and y is all other goods.

From this (using calculus – it doesn't matter how we know this) we know that $MU_x = y^3$, and $MU_y = 3xy^2$.

$I = \$120$, $P_x = \$3$, P_y (All other goods) = $\$1$

57. What is the Marginal Value of x in terms of y { $MV_{x/y}$ }? _____
58. Write the equation of the budget constraint: $y =$ _____
59. If I purchase no units of y (All other goods), how much x can I afford? _____
60. What is the optimal bundle of good x and y ? $x =$ ____ $y =$ ____
61. What Total Utility is received at the optimal bundle? _____

Suppose income increases to $\$240$.

62. Derive the new optimal bundle of x and y . $x =$ ____ $y =$ ____
63. Draw the Engel curve for good X .

64. Is good X a normal or an inferior good? _____.

F. 9 points. Use the following information for questions 65 through 66.

Suppose the only two goods you purchase are Apples and Bananas.

65. Draw an indifference curve diagram with bananas on the X axis. Suppose the price of bananas is $\$2$, the price of apples is $\$4$ and your income is $\$120$. Label the optimum basket before the price change A . (Note: with this information, you can't solve for the actual optimal basket. Just illustrate an optimal basket with your budget line and an arbitrary indifference curve.) Make sure to label your intercepts. [2pts]

Suppose the price of bananas increases to $\$3$. Draw in your new budget line. Make sure to label the intercepts. [2 pts]

66. Assume both goods are normal. Use your point A and 2 additional points (B and C) to illustrate the substitution and income effects of this price increase. Assume point B is your new optimal point. Make sure to clearly label the two effects using A , B and C . [5 pts]



G. 8 points. Use the following information for questions 67 through 71. (2 points each)

A firm has the production function $Q = LK^4$. Using calculus, the $MPL = K^4$, and the $MPK = 4LK^3$. The wage rate is \$4 per hour and the rental rate is \$16 per hour. The firm decides to set output equal to 1024 units.

- 67. What is the optimal level of K? _____
- 68. What is the optimal level of L? _____
- 69. What are the firm's total costs? _____
- 70. Graph the entire situation below. Label both curve, including endpoints, and indicate the optimal bundle.

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

H. 16 points. Use the following information for questions 72 through 79. (2 points each)

Consider a lake stocked with fish. The total value of fish caught at the lake depends on the number of fishers, as shown in the accompanying table. As the table indicates, 1 fisher can catch \$36 worth of fish in one day, 2 fishers can catch a total of \$66 worth of fish, 3 fishers can catch a total of \$90 worth of fish, and so forth. The fishers are identical, and the opportunity cost of a day at the lake is \$18 for each fisher.

Number of Fishers	Value per Fisher	Total Value of Fish Caught	Social Marginal Benefit
0 fishers	-----	\$0	-----
1		36	
2		66	
3		90	
4		108	
5		120	
6		126	
7		126	
8		120	

- 72. Complete the table by calculating the value of each fisher's catch, on average, and the social marginal benefit of the lake.
- 73. If use of the lake is non-excludable, how many fishers come to the lake? _____
- 74. What is the total value of their catch? _____
- 75. What is their total cost? _____
- 76. What is the social gain from the existence of the lake? _____
- 77. What is the optimal number of fishers at the lake? _____
- 78. What is the social gain if this optimum is achieved? _____
- 79. What entrance fee would lead to the optimal outcome? _____

I. 20 points. Use the following information for questions 80 through 90. (80-89 are 2 points each, 90 is 1 pt extra)

In the perfectly competitive, constant cost widget industry, each identical firm has **fixed costs of \$30**, and has the following marginal cost. Market demand is given in the right hand columns:

Marginal Cost		Space for scrap work			Demand		
Q	MC				Price	Q (old demand)	Q' (new demand)
1	2				2	80	32
2	4				4	70	28
3	5				5	60	24
4	7				7	50	20
5	12				12	40	15
6	18				18	30	10
7	20				20	20	5

80. What is the initial equilibrium price of a widget (p) ? _____

81. What is each firm's output (q) ? _____

82. How many firms are in the industry? _____

*** Now demand shifts such that we match the price P with the new Quantity Q'.

83. In the short run, what is the new price of widgets (p)? _____

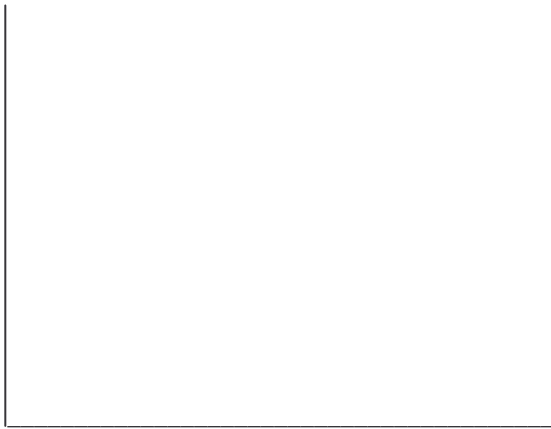
84. In the short run, what is the quantity of widgets produced by each firm (q)? _____

85. In the short run, what profit are the firms earning? _____

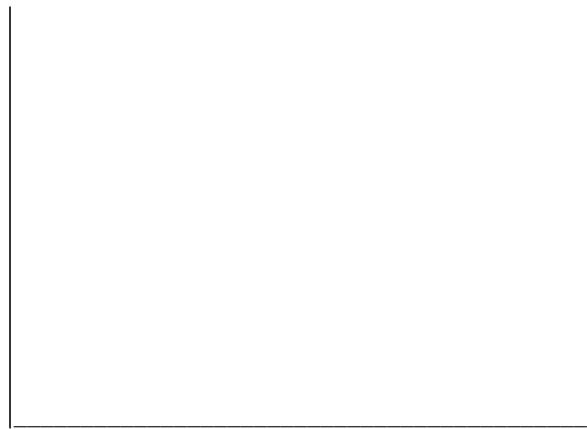
86. In the short run, how many firms are producing widgets? _____

87. In the long run, how many firms are producing widgets? _____

88. Draw a graph of the market. Illustrate the SR and LR effects of the shift in market demand.



89. Draw a graph of the typical firm. Illustrate the SR and LR effects of the shift in market demand.



90. If the fixed costs now become a function of the number of firms in the industry instead of the fixed \$30, specifically, $FC = N \cdot 12$, (where N = the number of firms), is this an increasing or decreasing cost industry? (circle one) [1 pt extra credit]