

**Economics 101**  
**Spring 2000**  
**Section 4 - Hallam**  
**Exam 4A - Blue**

1. Marginal revenue measures
  - a. the change in cost required to produce one more unit of output.
  - a. the change in output that can be obtained from one more dollar of expenditure.
  - a. the change in revenue from the production of one more unit of output.
  - a. the level of output divided by the level of input.
  - a. the change in output that results from one more unit of an input.
  
2. Marginal physical product measures
  - a. the change in cost required to produce one more unit of output
  - a. the change in output that can be obtained from one more dollar of expenditure
  - a. the change in output that results from one more unit of an input
  - a. the change in revenue from the production of one more unit of output
  - a. the level of output divided by the level of input
  
3. Marginal cost measures
  - a. the change in an input required to produce one more unit of output
  - a. the change in output that can be obtained from one more dollar of expenditure
  - a. the change in cost from the production of one more unit of output
  - a. the change in output that results from one more unit of an input
  - a. the level of output divided by the level of input
  
4. We say that a firm experiences *diseconomies of scale* or decreasing returns to size when
  - a. AC is decreasing
  - a.  $MC > AC$
  - a. the firm imposes costs on outside firms.
  - a.  $\epsilon_s$  (elasticity of scale)  $> 1$
  - a.  $AC > MC$
  
5. What is the shutdown rule for a firm in the short-run?
  - a. In the short-run, the firm should continue to produce if marginal revenue (MR) is equal to marginal cost (MC); otherwise, it should shut down
  - a. In the short-run, the firm should continue to produce if total revenue (TR) exceeds total costs (TC); otherwise, it should shut down
  - a. In the short-run, if some fixed costs are not sunk, the firm should continue to produce if  $(TR - TVC) > (TFC - \text{sunk fixed costs}) > 0$ ; otherwise, it should shut down
  - a. In the short-run, the firm should continue to produce if total revenue (TR) is less than total variable costs
  - a. Both a and c are reasonable rules.

6. For a firm to minimize cost which of the following must hold?

a. the slope of the isocost line  $\left( \frac{-w_2}{w_1} \right)$  and the slope of the isoquant curve must be equal

a.  $\frac{MPP_{x_2}}{w_2} = \frac{MPP_{x_1}}{w_1}$

c.  $\frac{-w_1}{w_2} = MRS_{x_1x_2} = \frac{\Delta x_1}{\Delta x_2}$

a. both a and b

a. a, b, and c

7. Consider two perfectly competitive firms with the following marginal cost functions

$$MC(y_1) = 8 + 5y_1$$

$$MC(y_2) = 8 + 2y_2$$

where  $y_i$  is the output of the  $i$ th firm? What is the supply equation for firm 2?

a.  $y_2 = \frac{1}{5}p - \frac{8}{5}$

a.  $y_2 = \frac{1}{2}p - 4$

a.  $y_2 = 4p - \frac{1}{2}$

a.  $y_2 = \frac{1}{5}p - 4$

a.  $y_2 = \frac{1}{2}p - \frac{8}{5}$

8. For the industry made up of the two firms in question 7, what is the industry supply equation?

a.  $Q = y_1 + y_2 = 4.5p - 4.5$

a.  $Q = y_1 + y_2 = \frac{7}{10}p - \frac{28}{5}$

a.  $Q = y_1 + y_2 = 4.2p - \frac{21}{10}$

a.  $Q = y_1 + y_2 = \frac{7}{10}p - 8$

a.  $Q = y_1 + y_2 = 4.2p - \frac{9}{5}$

For questions 9-10, consider the following data on output (Q), fixed cost (FC), variable cost (VC), total cost (C), average fixed (AFC), variable (AVC), total cost (ATC), marginal cost (MC), marginal revenue (MR), etc. The column labeled MC Δ is the change in cost computed as a difference, similarly for MR Δ. MC and MR are exact marginal cost and marginal revenue respectively.

Q	FC	VC	C	AFC	AVC	ATC	MC Δ	MC	Price	TR	MR Δ	MR
0.00	200	0.00	200.00					120.00	344	0		344
1.00	200	102.00	302.00	200.00	102.00	302.00	102.00	86.00	334	334	334.00	324
2.00	200	176.00	376.00	100.00	88.00	188.00	74.00	64.00	324	648	314.00	304
3.00	200	234.00	434.00	66.67	78.00	144.67	58.00	54.00	314	942	294.00	284
4.00	200	288.00	488.00	50.00	72.00	122.00	54.00	56.00	304	1216	274.00	264
5.00	200	350.00	550.00	40.00	70.00	110.00	62.00	70.00	294	1470	254.00	244
6.00	200	432.00	632.00	33.33	72.00	105.33	82.00	96.00	284	1704	234.00	224
7.00	200	546.00	746.00	28.57	78.00	106.57	114.00	134.00	274	1918	214.00	204
8.00	200	704.00	904.00	25.00	88.00	113.00	158.00	184.00	264	2112	194.00	184
9.00	200	918.00	1118.00	22.22	102.00	124.22	214.00	246.00	254	2286	174.00	164
10.00	200	1200.00	1400.00	20.00	120.00	140.00	282.00	320.00	244	2440	154.00	144
11.00	200	1562.00	1762.00	18.18	142.00	160.18	362.00	406.00	234	2574	134.00	124
12.00	200	2016.00	2216.00	16.67	168.00	184.67	454.00	504.00	224	2688	114.00	104
14.00	200	3248.00	3448.00	14.29	232.00	246.29	616.00	736.00	204	2856	84.00	64
16.00	200	4992.00	5192.00	12.50	312.00	324.50	872.00	1016.00	184	2944	44.00	24

9. This data represents a firm which is not a price taker. How much output should this firm produce?

- a. 10
- a. 8
- a. 6
- a. 4
- a. 7

10. If the firm was a price taker and the price of output was \$320, how much should the firm produce?
- a. 9
  - a. 8
  - a. 6
  - a. 10
  - a. 5

11. Consider the following table which shows cost and revenue data for a specific firm. Y denotes output, FC denotes fixed cost, VC denotes variable cost, C represents cost, AFC is average fixed cost, AVC is average variable cost, ATC is average total cost, and MC is marginal cost. TR is total revenue and MR is marginal revenue. How much output should the firm produce?

Y	FC	VC	C	AFC	AVC	ATC	MC	Price	TR	MR
0.00	200	0.00	200.00					268	0	268
1.00	200	127.00	327.00	200.00	127.00	327.00	115.00	258	258	248
2.00	200	232.00	432.00	100.00	116.00	216.00	96.00	248	496	228
3.00	200	321.00	521.00	66.67	107.00	173.67	83.00	238	714	208
4.00	200	400.00	600.00	50.00	100.00	150.00	76.00	228	912	188
5.00	200	475.00	675.00	40.00	95.00	135.00	75.00	218	1090	168
6.00	200	552.00	752.00	33.33	92.00	125.33	80.00	208	1248	148
7.00	200	637.00	837.00	28.57	91.00	119.57	91.00	198	1386	128
8.00	200	736.00	936.00	25.00	92.00	117.00	108.00	188	1504	108
9.00	200	855.00	1055.00	22.22	95.00	117.22	131.00	178	1602	88
10.00	200	1000.00	1200.00	20.00	100.00	120.00	160.00	168	1680	68
11.00	200	1177.00	1377.00	18.18	107.00	125.18	195.00	158	1738	48
12.00	200	1392.00	1592.00	16.67	116.00	132.67	236.00	148	1776	28
14.00	200	1960.00	2160.00	14.29	140.00	154.29	336.00	128	1792	-12

- a. 5  
b. 3  
c. 2  
d. 7  
e. 8

12. For this problem  $p_1 = 8$ ,  $p_2 = 4$  and  $I = 90$ . Below is a table of alternative consumption choices  $q_1$  and  $q_2$ , their cost and the marginal utility (MU) they provide. Which is the optimal choice?

$q_1$	$q_2$	cost	u	$MU_1$	$MU_2$
11.2500	0.0000	90.0000	6.9780	0.3418	0.9304
10.2500	2.0000	90.0000	8.1340	0.4338	0.6507
9.2500	4.0000	90.0000	8.8000	0.5151	0.5029
8.2500	6.0000	90.0000	9.1500	0.5935	0.4067
7.2500	8.0000	90.0000	9.2570	0.6732	0.3366
6.2500	10.0000	90.0000	9.1580	0.7579	0.2818
5.2500	12.0000	90.0000	8.8710	0.8516	0.2366
4.2500	14.0000	90.0000	8.4000	0.9600	0.1976

- a.  $q_1 = 9.25$        $q_2 = 4$   
b.  $q_1 = 8.25$ ,       $q_2 = 6$   
c.  $q_1 = 6.25$        $q_2 = 10$   
d.  $q_1 = 7.25$        $q_2 = 8$   
e.  $q_1 = 5.25$ ,       $q_2 = 12$

13. Consider the following production function

$$y = 40x_1 + 20x_2 - 0.5x_1^2 - 0.25x_2^2$$

The price of  $x_1$  is \$5 and the price of  $x_2$  is \$2. You are trying to which of the following sets of points is the cost minimizing way to produce 606 units of output. Which of the following points is the minimum cost way to produce 606 units of output?

$x_1$	$x_2$	$y$	$MPP_1$	$MPP_2$	$MRS$	$w_2/w_1$
11.787	12.000	606.000	28.213	14.000	-0.4962	
11.500	13.000		28.500	13.500		
10.845	14.000		29.155	13.000		
10.411	15.000		29.589	12.500		
10.000	16.000		30.000	12.000		
9.611	17.000		30.389	11.500		
9.000	18.000		31.000	11.000		
8.895	19.000	606.000	31.105	10.500		

- $x_1 = 11.500, x_2 = 13$
- $x_1 = 10.411, x_2 = 15$
- $x_1 = 10.000, x_2 = 16$
- $x_1 = 9.611, x_2 = 17$
- $x_1 = 9.000, x_2 = 18$

The following table is for use with questions 14-16. The underlying production function is

$$y = 40x_1 + 20x_2 - 2x_1^2 + x_1x_2 - x_2^2$$

The price of  $x_1$  is \$40 and the price of  $x_2$  is \$40. The price of the output of the firm is \$4. The prices of inputs are given by  $w_1$  and  $w_2$ .  $APP_i$  is the average physical product of the  $i$ th input while  $MPP_i$  is the marginal physical product of the  $i$ th input.  $MRS$  represents the marginal rate of substitution.

$x_1$	$x_2$	$w_1$	$w_2$	Output	Revenue	Cost	$APP_1$	$APP_2$	$MPP_1$	$MPP_2$	$MRS$	$w_2/w_1$
6	5	40	40		1092			54.600	21	16	-0.7619	
7	5	40	40					58.400	17	17		
8	5	40	40		1228			61.400	13	18		
9	5	40	40		1272			63.600	9	19		
8	10	40	40	372	1488				18	8		
9	10	40	40	388					14	9	-0.6429	
10	10	40	40		1600		40.000		10	10		
11	10	40	40	408			37.091		6	11		
11	15	40	40	438	1752		39.818		11	1	-0.0909	
13	15	40	40				34.769		3	3	-1	
15	15	40	40				30.000	30.000	-5	5		
17	15	40	40	432	1728		25.412	28.800	-13	7		

14. What is the average product of  $x_2$  when output is 408?

- 11
- 6
- 40.8
- 8
- 38

15. What is the minimum cost way of producing 292 units of output?
- $x_1 = 6, x_2 = 5$
  - $x_1 = 7, x_2 = 5$
  - $x_1 = 10, x_2 = 10$
  - $x_1 = 8, x_2 = 5$
  - $x_1 = 15, x_2 = 15$
16. Which of the following statements is true?
- The marginal rate of substitution of  $x_1$  for  $x_2$  when  $x_1 = 7$  and  $x_2 = 5$  is equal to -0.8.
  - The revenue when  $x_1 = 15$  and  $x_2 = 15$  is equal to 1820.
  - The value to the firm of using one more unit of  $x_1$  when  $x_1 = 10$  and  $x_2 = 10$  is equal to the cost of using one more unit of  $x_2$ .
  - The minimum cost way of producing 408 units of output is to use 11 units of  $x_1$  and 10 units of  $x_2$ .
  - The firm maximizes profits when output is equal to 388.
17. Consider the following table which shows the minimum cost way to produce various levels of output for a firm. Assume that the price of output is \$1.34. The prices of inputs are given by  $w_1$  and  $w_2$ . Marginal cost is abbreviated as MC.  $APP_i$  is the average physical product of the  $i$ th input while  $MPP_i$  is the marginal physical product of the  $i$ th input. How much output should the firm produce?

$x_1$	$x_2$	$w_1$	$w_2$	Output	MC	$APP_1$	$APP_2$	$MPP_1$	$MPP_2$
3.98069	2.9735	30	20	190	1.11	47.730	63.899	27.051	18.034
5.10257	4.516	30	20	245	1.24	48.015	54.251	24.106	16.07
5.73004	5.3788	30	20	273	1.34	47.644	50.755	22.459	14.972
5.80001	5.475	30	20	276	1.35	47.586	50.411	22.275	14.85
6.38212	6.2754	30	20	300	1.45	47.006	47.806	20.747	13.831
7.14857	7.3293	30	20	329	1.60	46.023	44.888	18.735	12.49
8.60632	9.3337	30	20	376	2.01	43.689	40.284	14.908	9.9389
9.51967	10.59	30	20	400	2.40	42.018	37.773	12.511	8.3406
11.1243	12.796	30	20	432	3.61	38.834	33.761	8.2988	5.5325
12	14	30	20	444	5.00	37.000	31.714	6	4
12.6007	14.826	30	20	450	6.78	35.712	30.352	4.4233	2.9488
13.3628	15.874	30	20	455	12.38	34.050	28.664	2.4227	1.6151

- 190
  - 300
  - 450
  - 273
  - 444
18. Opportunity cost is best described as
- the value of the time needed to make a choice
  - the value of the alternative opportunity given up when a choice is made
  - the most cost efficient way to produce an opportunity
  - the cost of discovering an opportunity
  - the cost of the inputs in a production process

19. Consider a firm with the following cost function.

$$\text{cost}(y) = 8 + 8y + 0.5y^2$$

Assume that in the long run, all costs are avoidable. Marginal cost is given by

$$MC(y) = 8 + y$$

Average cost reaches its minimum at the point where it is equal to marginal cost.

From a long-run perspective, what is the level of  $y$  at which average cost is minimized.

- a. 3
  - b. 3.5
  - c. 4
  - d. 6
  - e. 7.25
20. For the firm in problem 19, how high does the price need to be for the firm to continue operating?
- a. 11
  - b. 10
  - c. 11.5
  - d. 12
  - e. 13.5
21. Why do diseconomies of scale occur?
- a. changes in the quality of inputs
  - b. gains from specialization
  - c. problems motivating workers
  - d. all of the above
  - e. a and c above
22. Which of the following is a correct statement concerning expendables, capital, and capital services?
- a. Expendable factors of production are completely used up or consumed during a single production period. Capital is machinery, buildings and equipment. Capital services are the flows of financial assets and other services provided by the banking sector.
  - a. Expendable factors of production are completely used up or consumed during a single production period. Capital is a stock that is not used up during a single production period, and provides services over time. Capital services are the flow of productive services that can be obtained from a given capital stock during a production period.
  - a. Expendable factors of production are inputs that are purchased outside the firm. Capital is machinery, buildings and equipment along with human capital. Capital services are the flows of financial assets and other services provided by the banking sector.
  - a. Expendable factors of production are inputs that are purchased outside the firm. Capital is a stock that is not used up during a single production period, and provides services over time. Capital services are the flow of productive services that can be obtained from a given capital stock during a production period.



23. In perfect (pure) competition we usually say that
- a.  $2+2 = 5$
  - a. Thomas Jefferson was the 20<sup>th</sup> president of Israel
  - a. Iowa State University is located in Cambridge, IA
  - a. agents take prices as given and entry and exit barriers are minimal or nonexistent
  - a. The moon is made of green cheese

For questions 24 and 25, consider the following data on oil and soybean in Venezuela and Brazil where the data is production per time period. Assume that the production possibility frontier is linear. With no soybean production, Venezuela can produce 100,000 barrels of oil. With 2,000 tons of soybean, Venezuela has no oil production, etc.

	Oil	Soybean
Venezuela	100,000	0
Venezuela	0	2,000
Brazil	20,000	0
Brazil	0	40,000

24. Which of the following statements is true?
- a. Brazil has an absolute advantage in oil production.
  - a. Venezuela an absolute and comparative advantage in oil production.
  - a. Brazil has a comparative advantage in oil production.
  - a. Cannot say which country has an absolute advantage in either product.
  - a. Both c and d are correct.
25. If Venezuela produced 40,000 barrels of oil and Brazil produced 10,000 barrels of oil and each used their remaining resources for soybean production, what would total soybean production be?
- a. 20,800 tons
  - a. 18,800 tons
  - a. 51,200 tons
  - a. 21,200 tons
  - a. 53,200 tons

Use the following table to answer question 26 where the data in the table gives the cost per unit for each item.

	Per bushel wheat	Per kilo cocaine
Columbia	60 pesos	120 pesos
U.S.	\$4.00	\$100.00

26. Which of the following is true?
- a. Columbia has an absolute advantage in wheat production
  - a. Columbia has an absolute and a comparative advantage in producing cocaine
  - a. Columbia has a comparative advantage in producing cocaine
  - a. The U.S. has a comparative advantage in cocaine production.

**Economics 101**  
**Exam 4A - Blue**

Question	Correct Answer	# Right	Question	Correct Answer	# Right
1	c		14	c	
2	c		15	b	
3	c		16	c	
4	b		17	d	
5	c		18	b	
6	d		19	c	
7	b		20	d	
8	b		21	e	
9	b		22	b	
10	d		23	d	
11	e		24	b	
12	d		25	d	
13	c		26	c	

Table for Questions 14-16

$x_1$	$x_2$	$w_1$	$w_2$	Output	Revenue	Cost	APP <sub>1</sub>	APP <sub>2</sub>	MPP <sub>1</sub>	MPP <sub>2</sub>	MRS	$w_2/w_1$
6	5	40	40	273	1092	440	45.500	54.600	21	16	-0.7619	
7	5	40	40	292	1168	480	41.714	58.400	17	17	-1	
8	5	40	40	307	1228	520	38.375	61.400	13	18	-1.3846	
9	5	40	40	318	1272	560	35.333	63.600	9	19	-2.1111	
8	10	40	40	372	1488	720	46.500	37.200	18	8	-0.4444	
9	10	40	40	388	1552	760	43.111	38.800	14	9	-0.6429	
10	10	40	40	400	1600	800	40.000	40.000	10	10	-1	
11	10	40	40	408	1632	840	37.091	40.800	6	11	-1.8333	
11	15	40	40	438	1752	1040	39.818	29.200	11	1	-0.0909	
13	15	40	40	452	1808	1120	34.769	30.133	3	3	-1	
15	15	40	40	450	1800	1200	30.000	30.000	-5	5	1	
17	15	40	40	432	1728	1280	25.412	28.800	-13	7	0.5385	

Problem 17

$x_1$	$x_2$	$w_1$	$w_2$	Output	MC	APP <sub>1</sub>	APP <sub>2</sub>	MPP <sub>1</sub>	MPP <sub>2</sub>
3.98069	2.9735	30	20	190	1.11	47.730	63.899	27.051	18.034
5.10257	4.516	30	20	245	1.24	48.015	54.251	24.106	16.07
5.73004	5.3788	30	20	273	1.34	47.644	50.755	22.459	14.972
5.80001	5.475	30	20	276	1.35	47.586	50.411	22.275	14.85
6.38212	6.2754	30	20	300	1.45	47.006	47.806	20.747	13.831
7.14857	7.3293	30	20	329	1.60	46.023	44.888	18.735	12.49
8.60632	9.3337	30	20	376	2.01	43.689	40.284	14.908	9.9389
9.51967	10.59	30	20	400	2.40	42.018	37.773	12.511	8.3406
11.1243	12.796	30	20	432	3.61	38.834	33.761	8.2988	5.5325
12	14	30	20	444	5.00	37.000	31.714	6	4
12.6007	14.826	30	20	450	6.78	35.712	30.352	4.4233	2.9488
13.3628	15.874	30	20	455	12.38	34.050	28.664	2.4227	1.6151