

**Economics 101**  
**Spring 2001**  
**Section 4 - Hallam**  
**Exam 3A-Blue**

1. Marginal physical product measures
  - a. the change in cost required to produce one more unit of output.
  - b. the change in output that can be obtained from one more dollar of expenditure.
  - c. the change in revenue from the production of one more unit of output.
  - d. the change in output that results from one more unit of an input.
  - e. the level of output divided by the level of input.
  
2. Marginal cost measures
  - a. the change in an input required to produce one more unit of output.
  - b. the change in cost from the production of one more unit of output.
  - c. the change in output that can be obtained from one more dollar of expenditure.
  - d. the change in output that results from one more unit of an input.
  - e. the level of output divided by the level of input.
  
3. 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
  - b.  $\frac{MPP_{x_2}}{w_2} = \frac{MPP_{x_1}}{w_1}$
  - c.  $\frac{-w_1}{w_2} = MRS_{x_1x_2} = \frac{\Delta x_1}{\Delta x_2}$
  - d. both a and b
  - e. a, b, and c
  
4. For this problem  $p_1 = 10$ ,  $p_2 = 4$  and Income = 88. 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	$MU_1$	$MU_2$
8.8000	0.00	88.0000	0.3594	0.8627
8.0000	2.00	88.0000	0.4547	0.6063
7.2000	4.00	88.0000	0.5379	0.4713
6.8000	5.00	88.0000	0.5776	0.4236
6.0000	7.00	88.0000	0.6560	0.3499
5.2000	9.00	88.0000	0.7361	0.2944
4.4000	11.00	88.0000	0.8207	0.2501
3.2000	14.00	88.0000	0.9637	0.1965

- a.  $q_1 = 8.00$        $q_2 = 2$
- b.  $q_1 = 6.80$        $q_2 = 5$
- c.  $q_1 = 6.00$        $q_2 = 7$
- d.  $q_1 = 5.20$        $q_2 = 9$
- e.  $q_1 = 4.40$        $q_2 = 11$

5. What is the elasticity of demand (mid-point formula) for a demand curve given by  $Q^D = 300 - 5P$  as price goes from \$40 to \$36?
- 1.7272
  - 8.6363
  - 0.06909
  - 3.4545
  - 14.4737
6. Along any isoquant we know that output remains constant as we change levels of  $x_1$  and  $x_2$ . We can write this statement in equation form as  $\Delta x_1 MPP_{x_1} + \Delta x_2 MPP_{x_2} = 0$ . This implies that
- $\frac{-w_2}{w_1} = \frac{\Delta x_1}{\Delta x_2}$
  - $\frac{\Delta x_1}{\Delta x_2} = -\frac{MU_{x_2}}{MU_{x_1}}$
  - $\frac{\Delta x_1}{\Delta x_2} = -\frac{MPP_{x_2}}{MPP_{x_1}}$
  - The marginal rate of substitution of  $x_1$  for  $x_2$  is equal to  $-\frac{MPP_{x_2}}{MPP_{x_1}}$
  - Both c and d are correct

Use the following table to answer questions 7 and 8 where the data in the table gives the **cost per unit** for each item.

	Per kilogram tea	Per kilogram rice
Sri Lanka	225 rupees	25 rupees
Thailand	150 bhat	12.50 bhat

7. What is the opportunity cost of producing one more kilo of tea in Sri Lanka?
- 9 kilos tea
  - 12 kilos rice
  - 9 kilos rice
  - 1/9 kilo rice
  - 25 rupees
8. Which of the following is true?
- Thailand has a comparative advantage in producing tea
  - Sri Lanka has a comparative advantage in producing tea
  - The opportunity cost of tea in Thailand is 10 kilograms of rice
  - Thailand has an absolute advantage in producing rice
  - Sri Lanka has an absolute and a comparative advantage in producing tea

9. Consider the following hypothetical data on cake and pie production in Sweden and Denmark. Assume that capital is freely mobile so only labor costs matter. Also assume that real wages will tend to equalize so that only labor quantities matter. The data below gives the number of **minutes required per unit of output**.

	Cakes	Pies
Sweden	50 minutes	90 minutes
Denmark	40 minutes	80 minutes

Which of the following statements is true?

- Sweden has an absolute advantage in producing pies
- Denmark has a comparative advantage in producing pies
- Sweden has a comparative advantage in producing pies
- Denmark can produce a pie in half as much time as it can produce a cake
- Both c and d are correct

For questions 10, 11 and 12 consider the following data on coffee and soybean in Chile and Argentina where the data is production per time period. Assume that the production possibility frontier is linear. With no soybean production, Chile can produce 80,000 bags of coffee. With 2,000 tons of soybean, Chile has no coffee production, etc.

	Coffee	Soybean
Chile	80,000	0
Chile	0	2,000
Argentina	90,000	0
Argentina	0	3,000

10. Which of the following statements is true?
- Argentina has an absolute disadvantage in soybean production
  - Chile has an absolute and comparative advantage in coffee production
  - Argentina has a comparative advantage in coffee production
  - Argentina has a comparative advantage in soybean production
  - Both b and d are correct.
11. If Chile produced 40,000 bags of coffee and Argentina produced 60,000 bags of coffee and each used their remaining resources for soybean production, what would total soybean production be?
- 3,333.33 tons
  - 2,166.66 tons
  - 2000 tons
  - 1000 tons
  - 2100 tons
12. If Chile produced 12,000 more bags of coffee and Argentina produced 12,000 less bags of coffee and each used their remaining resources for soybean production, what would total soybean production be?
- 3,000 tons
  - 2,166.66 tons
  - 2000 tons
  - 1500 tons
  - 2100 tons

13. Ignoring all other goods, if Elijah's marginal utility per pound of meal is 40 and per cask of wine is 200, his
- total utility would be maximized if the price per pound of meal is one-fourth the price per cask of wine.
  - total utility could be increased by buying more wine and less meal.
  - total utility could be increased by buying more meal and less wine.
  - total utility would be maximized if the price per cask of wine is one-fifth the price per pound of meal.
  - total utility would be maximized if the price per cask of wine is 5 times the price per pound of meal.
14. The marginal rate of substitution measures
- the additional utility from consuming one more unit of a product.
  - the rate at which weak hitting infielders may be traded for slow outfielders.
  - the additional product produced from one more unit of an input.
  - the percentage change in the quantity demanded of a product when the price of a substitute product changes.
  - the amount of one input that must be added when decreasing the level of the other input by one unit to keep total production constant.
15. Fixed costs are those costs
- that are affected by the firm's actions in the current period.
  - that are tied to buildings and equipment.
  - that the firm is committed to pay for factors of production, regardless of the firm's current decisions.
  - that the firm cannot recover if it liquidates.
  - that have been adjusted by mafia hit men.
16. When marginal product is rising
- total product is falling.
  - average product is falling.
  - total product is rising at a decreasing rate.
  - average product is at a maximum.
  - total product is rising at an increasing rate.
17. Which of the following statements is true?
- The substitution effect of a price change measures movements between indifference curves
  - The income effect of a price change measures the change in the quantity demanded of a good due exclusively to changes in real income with prices held fixed
  - The income effect of a price change can be of either sign
  - The substitution effect of a price change can be of either sign
  - Both b and c are correct
18. The production function gives
- all output levels attainable for a given level of input.
  - the maximum output attainable for a given combination of inputs.
  - the change in output that can be obtained from one more dollar of expenditure.
  - the change in output that results from one more unit of an input.
  - the level of output divided by the level of input.

19. For this problem  $p_1 = 10$ ,  $p_2 = 8$  and Income = 116. 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	$MU_1$	$MU_2$
11.6000	0.0000	116.0000	0.4448	0.8642
10.0000	2.0000	116.0000	0.5384	0.5537
9.2000	3.0000	116.0000	0.5805	0.4644
8.4000	4.0000	116.0000	0.6217	0.3958
7.6000	5.0000	116.0000	0.6628	0.3409
6.0000	7.0000	116.0000	0.7485	0.2566
4.4000	9.0000	116.0000	0.8454	0.1932

- a.  $q_1 = 10.00$        $q_2 = 2$
- b.  $q_1 = 9.20$        $q_2 = 3$
- c.  $q_1 = 8.40$        $q_2 = 4$
- d.  $q_1 = 7.60$        $q_2 = 5$
- e.  $q_1 = 6.00$        $q_2 = 7$

For questions 20 and 21, consider the following table. All of the combinations of  $q_1$  and  $q_2$  lead to a utility level of 9.666. The price of  $q_1$  is \$8 and the price of  $q_2$  is \$4 and income is \$68.  $\Delta q_1$  and  $\Delta q_2$  are computed with the upper number being subtracted from the lower one.

$q_1$	$q_2$	$\Delta q_1$	$\Delta q_2$	cost	u	$MU_1$	$MU_2$
1.5073	15	-	-	72.06	9.666	1.1024	0.3052
1.8036	14	0.2963	-1		9.666	1.0165	0.3222
2.1441	13	0.3405	-1		9.666	0.9330	0.3411
2.5387	12	0.3945	-1		9.666	0.8519	0.3625
3.0000	11	0.4613	-1		9.666	0.7733	0.3866
3.5452	10	0.5452	-1		9.666	0.6972	0.4143
4.1971	9	0.6520	-1		9.666	0.6239	0.4461
4.9877	8	0.7906	-1	71.90	9.666	0.5533	0.4833
5.9619	7	0.9742	-1		9.666	0.4856	0.5272
7.1856	6	1.2237	-1		9.666	0.4209	0.5800
8.7583	5	1.5727	-1		9.666	0.3594	0.6444
10.8372	4	2.0790	-1	102.70	9.666	0.3012	0.7249

20. What is the slope of the budget line for this consumer?

- a. -0.5
- b. -0.6667
- c. -0.3333
- d. -1.5
- e. -2.000

21. Which of the following is correct?

- a. If  $q_1 = 3$  and  $q_2 = 11.00$  and the consumer decides to reduce  $q_2$  to 10, she can afford to increase  $q_1$  to 4 with income of \$68?
- b. The marginal utility per dollar for good 1 when  $q_1 = 3$  and  $q_2 = 11$  is 0.1933
- c. If income were raised to \$136, the price of  $q_1$  to \$16 and the price of  $q_2$  to \$8, this consumer should choose 3 units of good 1 and 11 units of good 2 to maximize utility.
- d. The marginal rate of substitution of  $q_1$  for  $q_2$  when  $q_1 = 3$  and  $q_2 = 11$  is -0.60
- e. If the consumer reduces  $q_2$  from 8 to 7, she must increase  $q_1$  by 1.2237 to keep utility at 9.666

The following table is for use with questions 22-24. The underlying production function is

$$y = 60x_1 + 20x_2 - 2x_1^2 + 2x_1x_2 - x_2^2$$

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	$-w_2/w_1$
7	2	40	40		1544			193.000	36	30		
8	2	40	40						32	32		
9	2	40	40	450					28	34		
10	2	40	40	476			47.600	238.000	24	36	-1.5	
8	5	40	40	507	2028				38	26	-0.6842	
9	5	40	40	543	2172				34	28	-0.8235	
10	5	40	40		2300				30	30		
11	5	40	40						26	32		
29	38	40	40					41.526	20	2		
30	38	40	40	1596			53.200		16	4	-0.25	
31	38	40	40	1610	6440		51.935		12	6		
32	38	40	40	1620	6480		50.625	42.632	8	8		

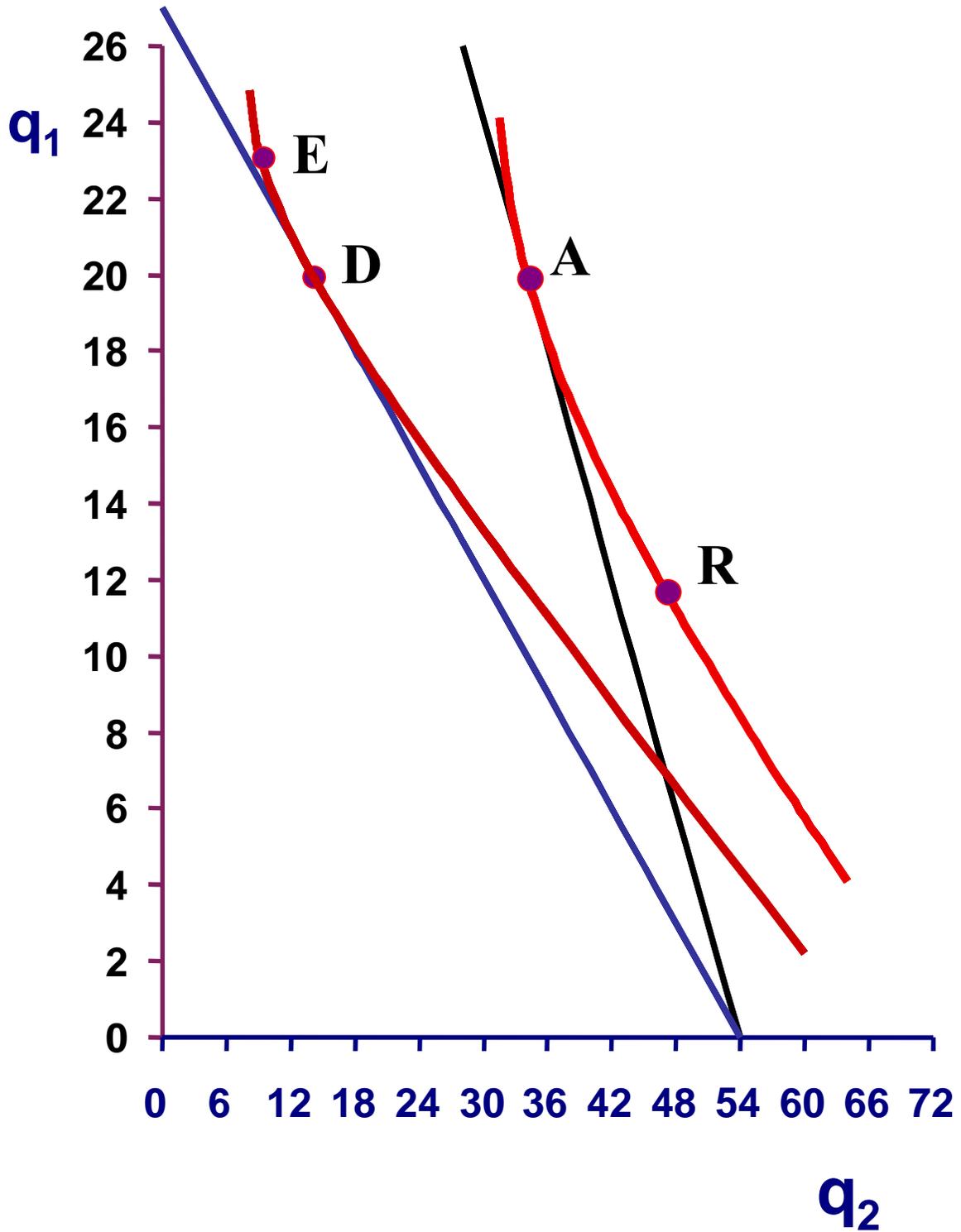
22. What is the average product of  $x_2$  when output is 450?
- 238
  - 36
  - 225
  - 50
  - 28
23. What is the minimum cost way of producing 420 units of output?
- $x_1 = 7, x_2 = 2$
  - $x_1 = 8, x_2 = 2$
  - $x_1 = 9, x_2 = 2$
  - $x_1 = 10, x_2 = 5$
  - $x_1 = 38, x_2 = 40$
24. Which of the following statements is true?
- The marginal rate of substitution of  $x_1$  for  $x_2$  when  $x_1 = 9$  and  $x_2 = 2$  is equal to  $-17/14$ .
  - The minimum cost way of producing 1596 units of output is to use 30 units of  $x_1$  and 38 units of  $x_2$ .
  - The value to the firm of using one more unit of  $x_1$  when  $x_1 = 32$  and  $x_2 = 38$  is equal to the value of using one more unit of  $x_2$ .
  - The minimum cost way of producing 476 units of output is to use 10 units of  $x_1$  and 2 units of  $x_2$ .
  - Both a and c are correct.

The following table is for use with questions 25 and 26.

<b>Production Data</b>				
x (Input)	y (Output)	APP	Discrete	MPP
0	0			
1	19.4	19.4		19.4
2	37.6			
3	54.6			
4	70.4			
5	85	17		14.6
6	98.4	16.4		
7	110.6	15.8		
8	121.6			
9	131.4			
10	140			8.6
12	153.6			
14	162.4			4.4
16	166.4	10.4		
18	165.6	9.2		
20	160			-2.8
22	149.6			-5.2

25. What is the average product of x when x = 10 and y = 140?
- 6.8
  - 14.6
  - 10.4
  - 14
  - 12.80
26. What is the discrete marginal product of x when x goes from 7 to 8?
- 12.2
  - 11
  - 9.8
  - 14
  - 15.8
27. In the diagram on the next page there is an increase in the price of good 1. The initial situation is  $p_1 = 1$ ,  $p_2 = 1$ , and income = 54. Which of the following is correct?
- The overall impact of the price change is to demand the same amount of  $q_1$
  - The income effect of the price change is to move from point A to point R
  - $q_1$  is an inferior good
  - Both a and c are correct
  - Both a and b are correct

# Increase in $p_1$



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

Table for Questions 22-24

$x_1$	$x_2$	$w_1$	$w_2$	Output	Revenue	Cost	APP <sub>1</sub>	APP <sub>2</sub>	MPP <sub>1</sub>	MPP <sub>2</sub>	MRS	$w_2/w_1$
7	2	40	40	386	1544	360	55.143	193.000	36	30	-0.8333	-1
8	2	40	40	420	1680	400	52.500	210.000	32	32	-1	-1
9	2	40	40	450	1800	440	50.000	225.000	28	34	-1.2143	-1
10	2	40	40	476	1904	480	47.600	238.000	24	36	-1.5	-1
8	5	40	40	507	2028	520	63.375	101.400	38	26	-0.6842	-1
9	5	40	40	543	2172	560	60.333	108.600	34	28	-0.8235	-1
10	5	40	40	575	2300	600	57.500	115.000	30	30	-1	-1
11	5	40	40	603	2412	640	54.818	120.600	26	32	-1.2308	-1
29	38	40	40	1578	6312	2680	54.414	41.526	20	2	-0.1	-1
30	38	40	40	1596	6384	2720	53.200	42.000	16	4	-0.25	-1
31	38	40	40	1610	6440	2760	51.935	42.368	12	6	-0.5	-1
32	38	40	40	1620	6480	2800	50.625	42.632	8	8	-1	-1