Economics 101
Spring 2000
Section 4 - Hallam
Quiz 9

1. 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 $6.46. How much output should the firm produce? 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 ith input while MPP_i is the marginal physical product of the ith input. MRS represents the marginal rate of substitution.

x_1	x_2	w_1	w_2	Output	MC	APP_1	APP_2	MPP_1	MPP_2	MRS	w_2/w_1
10.196	11.370	60.00	28.00	365.0	3.75	35.797	32.102	15.977	7.456	-0.467	-0.467
10.903	11.924	60.00	28.00	380.0	3.96	34.854	31.869	15.118	7.055	-0.467	-0.467
11.000	12.000	60.00	28.00	382.0	4.00	34.727	31.833	15.000	7.000	-0.467	-0.467
11.397	12.311	60.00	28.00	390.0	4.13	34.220	31.679	14.517	6.775	-0.467	-0.467
12.018	12.798	60.00	28.00	402.0	4.36	33.449	31.411	13.762	6.422	-0.467	-0.467
13.020	13.584	60.00	28.00	420.0	4.78	32.257	30.920	12.543	5.853	-0.467	-0.467
15.705	15.687	60.00	28.00	460.0	6.46	29.291	29.323	9.278	4.330	-0.467	-0.467
15.864	15.813	60.00	28.00	462.0	6.60	29.122	29.217	9.084	4.239	-0.467	-0.467
16.027	15.940	60.00	28.00	464.0	6.75	28.951	29.109	8.886	4.147	-0.467	-0.467
16.540	16.342	60.00	28.00	470.0	7.26	28.417	28.761	8.263	3.856	-0.467	-0.467
17.493	17.089	60.00	28.00	480.0	8.44	27.440	28.089	7.104	3.315	-0.467	-0.467
17.702	17.253	60.00	28.00	482.0	8.76	27.228	27.937	6.848	3.196	-0.467	-0.467

   a. 380
   b. 382
   c. 402
   d. 460
   e. Cannot tell from the data

2. Consider the following table which shows cost and revenue data for a specific price setting 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	150	0.00	150.00					480	0	480
1.00	150	61.00	211.00	150.00	61.00	211.00	64.00	470	470	460
2.00	150	132.00	282.00	75.00	66.00	141.00	80.00	460	920	440
3.00	150	225.00	375.00	50.00	75.00	125.00	108.00	450	1350	420
4.00	150	352.00	502.00	37.50	88.00	125.50	148.00	440	1760	400
5.00	150	525.00	675.00	30.00	105.00	135.00	200.00	430	2150	380
6.00	150	756.00	906.00	25.00	126.00	151.00	264.00	420	2520	360
7.00	150	1057.00	1207.00	21.43	151.00	172.43	340.00	410	2870	340
8.00	150	1440.00	1590.00	18.75	180.00	198.75	428.00	400	3200	320
9.00	150	1917.00	2067.00	16.67	213.00	229.67	528.00	390	3510	300
10.00	150	2500.00	2650.00	15.00	250.00	265.00	640.00	380	3800	280
11.00	150	3201.00	3351.00	13.64	291.00	304.64	764.00	370	4070	260

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

3. Consider a firm with the following cost function.

$$cost(y) = 16 + 7y + y^2$$

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

$$MC(y) = 7 + 2y$$

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

4. For the firm in problem 3, how high does the price need to be for the firm to continue operating in the long run?

a. 16
b. 10
c. 11.5
d. 12
e. 15

5. What is the long run supply function for the firm in problem 3?

a. y = 0 if $p \leq 16$, y = ½ p - 3.5 if $p \geq 16$
b. y = 0 if $p \leq 16$, y = 2p - 20 if $p \geq 16$
c. y = 0 if $p \leq 12$, y = p - 8 if $p \geq 12$
d. y = 0 if $p \leq 15$, y = ½ p - 3.5 if $p \geq 15$
e. y = 0 if $p \leq 12$, y = p - 8 if $p \geq 15$

6. Consider a firm with the following cost function.

$$cost(y) = 16 + 20y + 0.25y^2$$

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

$$MC(y) = 20 + 0.5y$$

Average cost reaches its minimum at the point where it is equal to marginal cost. For this firm the output where average cost is a minimum is 8 units with an average cost of $24.

What is the long run supply function for this firm?

a. y = 0 if $p \leq 24$, y = ½ p - 10 if $p \geq 24$
b. y = 0 if $p \leq 24$, y = 2p - 40 if $p \geq 24$
c. y = 0 if $p \leq 16$, y = 2p - 20 if $p \geq 16$
d. y = 0 if $p \leq 24$, y = ½ p - 40 if $p \geq 24$
e. y = 0 if $p \leq 24$, y = p - 20 if $p \geq 24$

7. Assume the demand function for a market containing only the firm in problems 3 and 6 is given by

$$Q = 51 - p$$

What will be the long run equilibrium price in this market?

a. 27
b. 63
c. 49 2/3
d. 24
e. 24.75

Consider the table on the next page for questions 8 and 9 where y is output, LRTC is long run total cost, LRATC is long run average total cost, LRMC is long run marginal cost, SRAC is short run average total cost, SRMC is short run marginal cost, and the number after SRAC denotes plant size.

8. If the price was permanently $252, what size plant should the firm build?
   a. 4
   b. 12
   c. 16
   d. 18
   e. can't tell from the data

9. What will be the long run price and marginal cost in this industry if there is free entry and exit and all firms have the same cost structure?
   a. 172
   b. 200
   c. 223
   d. 252
   e. 328

y	LRTC	LRATC	LRMC	SRAC 4	SRMC 4	SRAC 12	SRMC 12	SRAC 16	SRMC 16	SRAC 18	SRMC 18
0.00	0.00										
1.00	281.00	281.00	263.00	371.00	203.00	1491.00	43.00	2531.00		3171.00	
2.00	528.00	264.00	232.00	284.00	192.00	764.00	32.00	1244.00		1544.00	
3.00	747.00	249.00	207.00	252.33	187.00	519.00	27.00	812.33		999.00	
4.00	944.00	236.00	188.00	236.00	188.00	396.00	28.00	596.00		726.00	
5.00	1125.00	225.00	175.00	227.00	195.00	323.00	35.00	467.00		563.00	
6.00	1296.00	216.00	168.00	222.67	208.00	276.00	48.00	382.67		456.00	
7.00	1463.00	209.00	167.00	221.86	227.00	244.71	67.00	324.71		381.86	
8.00	1632.00	204.00	172.00	224	252.00	224.00	92.00	284.00	12.00	329.00	
9.00	**1809.00**	**201.00**	**183.00**	**228.78**	**283.00**	**211.00**	**123.00**	**255.44**	**43.00**	**291.00**	**3.00**
10.00	2000.00	200.00	200.00	236.00	320.00	204.00	160.00	236.00	80.00	264.00	40.00
11.00	2211.00	201.00	223.00	245.55	363.00	201.91	203.00	223.73	123.00	245.55	83.00
12.00	2448.00	204.00	252.00	257.33	412.00	204.00	252.00	217.33	172.00	234.00	132.00
13.00	2717.00	209.00	287.00	271.31	467.00	209.77	307.00	215.92	227.00	228.23	187.00
14.00	3024.00	216.00	328.00	287.43	528.00	218.86	368.00	218.86	288.00	227.43	248.00
15.00	**3375.00**	**225.00**	**375.00**	**305.67**	**595.00**	**231.00**	**435.00**	**225.67**	**355.00**	**231.00**	**315.00**
16.00	3776.00	236.00	428.00	326.00	668.00	246.00	508.00	236.00	428.00	238.50	388.00
17.00	4233.00	249.00	487.00	348.41	747.00	263.71	587.00	249.59	507.00	249.59	467.00
18.00	4752.00	264.00	552.00	372.89	832.00	284.00	672.00	266.22	592.00	264.00	552.00
19.00	5339.00	281.00	623.00	399.42	923.00	306.79	763.00	285.74	683.00	281.53	643.00
20.00	6000.00	300.00	700.00	428.00	1020.00	332.00	860.00	308.00	780.00	302.00	740.00
22.00	7568.00	344.00	872.00	491.27	1232.00	389.45	1072.00	360.36	992.00	351.27	952.00
23.00	**8487.00**	**369.00**	**967.00**	**525.96**	**1347.00**	**421.61**	**1187.00**	**390.30**	**1107.00**	**379.87**	**1067.00**
25.00	10625.00	425.00	1175.00	601.40	1595.00	492.60	1435.00	457.40	1355.00	444.60	1315.00
26.00	11856.00	456.00	1288.00	642.15	1728.00	531.38	1568.00	494.46	1488.00	480.62	1448.00
28.00	14672.00	524.00	1532.00	729.71	2012.00	615.43	1852.00	575.43	1772.00	559.71	1732.00
30.00	18000.00	600.00	1800.00	825.33	2320.00	708.00	2160.00	665.33	2080.00	648.00	2040.00

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Answer Key

Question	Correct Answer
1	d
2	d
3	c
4	e
5	d
6	b
7	a
8	b
9	b