جامعة بيرزيت
BIRZEIT UNIVERSITY

96/100

ECON 3311 –Intermediate Microeconomic

Second Exam

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Answer Sheet

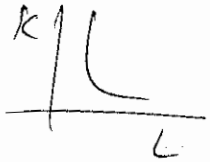
1.	A	B	C	(D)	E
2.	A	B	(C)	D	E
3.	A	B	(C)	D	E
4.	A	B	C	(D)	E
5.	A	B	(C)	D	E
6.	A	B	(C)	D	E
7.	A	B	C	(D)	E
8.	A	(B)	X	D	F
9.	A	B	(C)	D	E
10.	A	B	(C)	D	E
11.	A	B	C	(D)	E
12.	(A)	B	C	D	E
13.	A	(B)	C	D	E
14.	A	B	(C)	D	E
15.	A	(B)	C	D	E
16.	A	B	C	(D)	E
17.	(A)	B	C	D	E
18.	(A)	B	C	D	E
19.	A	(B)	C	D	E
20.	A	B	C	(D)	E

17.5

Section I: Multiple Choices (2.5 points each).

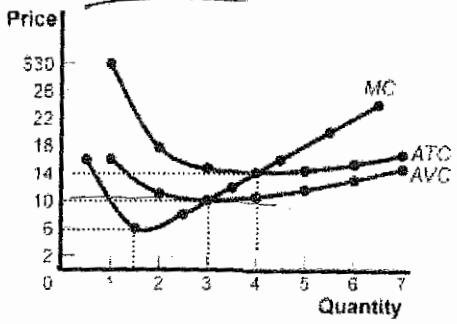
Please, circle the correct answer for each of the following 20 multiple-choice questions. For each question, only one of the answers is correct.

1. If a firm moves from one point on a production isoquant to another, which of the following will **NOT** happen.
   (A) A change in the ratio in which the inputs are combined.
   (B) A change in the marginal products of the inputs.
   (C) A change in the rate of technical substitution.
   (D) A change in the level of output.



2. The rate at which one input can be exchanged (يمكننا تبديلها) for another input without altering the level of output is called the
   (A) Marginal product curve.
   (B) Average product curve.
   (C) Marginal rate of technical substitution.
   (D) Law of diminishing marginal returns.

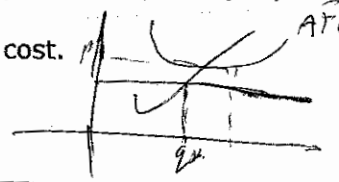
3. Consider the following cost curve illustrates for the below figure for a perfectly competitive firm. The short-run supply curve for this firm is its
   (A) Marginal cost curve.
   (B) Marginal cost curve at or above $6.
   (C) Marginal cost curve at or above $10.
   (D) AVC curve at or above $10.



4. If an individual firm is a price taker, then
   (A) It faces a horizontal demand curve.
   (B) It has no real control over the price that it charges; if it raises its price, it will lose all of its customers, and if it lowers its price, it loses revenue.
   (C) Its price is determined by the market-supply and market-demand curves.
   (D) All of these.

5. A fixed proportions production function
   (A) Has vertical line isoquants.
   (B) Has straight line isoquants $(Q = aL + bk)$.
   (C) Has L-shaped isoquants $(Q = min\ \{aL, bK\})$.
   (D) Has a constant marginal rate of technical substitution as the firm substitutes labor for capital.

6. Suppose that, at the current level of output, a firm in a perfectly competitive market is producing at a level such that price exceeds marginal cost (P > MC). Marginal cost is normally shaped (U-shaped). the firm
   (A) Is currently maximizing profit since it is charging a price higher than marginal cost.
   (B) Could increase profit by lowering the level of output.
   (C) Could increase profit by raising the level of output.
   (D) Cannot increase profit without raising price.



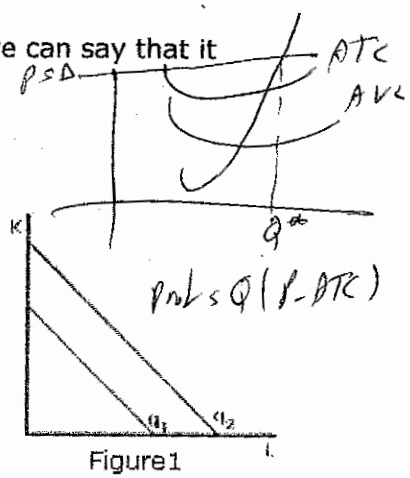
7. A competitive firm has the following short run cost function $TC = Q^3 - 8Q^2 + 30Q + 70$. What are the average variable cost, average total cost, and marginal cost to produce 10 units of output?
   (A) AVC = 500, ATC = 507, MC = 170
   (B) AVC = 50, ATC = 57, MC = 240
   (C) AVC = 500, ATC = 507, MC = 240
   (D) AVC = 50, ATC = 57, MC = 170

8. If a firm has $TC = 2q^{1.5} + 18q^{0.5} + 66$, what is the shutdown price for this firm?
   (A) 2 (B) 9 (C) 12 (D) 81

9. A firm faces the following production function $Q = 2K^{0.5} L^{0.5}$ Where Q is output, K is the capital input, which is fixed at 25 units in the short run, and L is the labour input per time period. The wage rate is £2 and the rental rate on capital is £1 per unit. What is the short run total cost?

(A) $25 + \frac{Q^2}{100}$
(B) $25 + \sqrt{Q}$
(C) $25 + \frac{Q^2}{50}$
(D) $25 + \frac{Q^2}{25}$

10. When a perfectly competitive firm is at its profit-maximizing level of output, we can say that it
(A) Is producing where MC= AC.
(B) Is producing where price exceeds (أكبر من) marginal cost.
(C) May be making a profit or incurring a loss (يتحمل خسارة).
(D) Is producing where P = AVC.



11. Given the isoquants map in the figure1, which of the following is true?
(A) The inputs are perfect substitutes
(B) The marginal rate of technical substitution is constant
(C) As labor increases, the amount of capital that must be given up to maintain output decreases
(D) (A) and (B).

Figure1

12. Suppose a perfectly competitive firm produce in the short run has a profit function is given by:
$\pi(q) = 120Q - 2Q^2 - 10$. How much will it produce to max profit?
(A) Q = 30 (B) Q = 40 (C) Q = 120 (D) Q= 10

13. Average total cost will equal marginal cost when
(A) MC is at its lowest point.
(B) ATC is at its lowest point.
(C) ATC is zero.
(D) MC is declining

14. Suppose a firm has the following production function: $q(L,K) = \frac{L}{2} + \sqrt{K}$. Which of the following is true about this production function?
(A) It has increasing returns to scale
(B) It has constant returns to scale
(C) It has decreasing returns to scale
(D) None of the above

15. Suppose a firm's production function is given by $q(L,K) = 4KL + L^2$, where K is capital and L is labor. What is the marginal product of labor when 4 units of capital and 10 units of labor are employed?
(A) 60 (B) 36 (C) 16 (D) 260

16. Suppose the wage rate is 2 and the rental rate is 5. Which of the following combinations of capital and labor are on the isocost line for total cost equal to 500?
(A) K = 50, L = 100
(B) K = 75, L = 100
(C) K = 25, L = 300
(D) K = 40, L = 150

17. The expansion path graphs
(A) The combinations of capital and labor that minimize total cost for various levels of output.
(B) The combinations of capital and labor that have the same total cost for various levels of output.
(C) The combinations of capital and labor that have the same level of output.
(D) How the firm can expand output while holding total cost constant.

18. If a profit-maximizing firm finds that, at its current level of production, MR < MC, it will
(A) Decrease output.
(B) Increase output.
(C) Shut down.
(D) Operate at a loss.

19. A firm that shuts down and produces no output incurs a loss (تتكبد خسارة) equal to its
(A) Marginal costs.
(B) Total fixed costs.
(C) Total variable costs.
(D) Marginal revenue.

20. What does the result $MC = \frac{w}{MPL}$ tell us (تقول لنا)?
(A) In the short run, diminishing marginal returns to labor cause marginal cost to increase
(B) In the short run, an increase in the cost of labor causes marginal cost to increase
(C) In the short run, marginal cost can be decreased by increasing the amount of capital
(D) All of the above

Section II: Essay Questions (50 points)

Question #1(16 points)

A factory has production function $q = 3\sqrt{LK}$. It faces factor prices w = 6 and r = 3. In the short run, this factory's capital is fixed at K = 16.

1. derive the short run total cost STC for the factory

$STC = wL + rK + FC \Rightarrow \therefore STC = 6L + 3*16 \Rightarrow STC = 6L + 48$

$\therefore STC = 6\left(\frac{q^2}{144}\right) + 48 \Rightarrow \therefore STC = \frac{q^2}{24} + 48$

$q = 3\sqrt{LK} = 3\sqrt{L16}$

$\therefore q = 3*4*\sqrt{L}$

$q = 12\sqrt{L}$

$\therefore q^2 = 144L$

$\therefore L = \frac{q^2}{144}$

2. derive the short run supply curve for the factory

short run supply curve is the positive portion of MC that locate above the min AVC.

$\therefore MC = P \Rightarrow MC = \frac{2q}{24} = \frac{q}{12} \Rightarrow \therefore MC = \frac{q}{12}$

$\therefore P = \frac{q}{12}$

3. If the factory sells its output at a price of 3, how many units of labor will the firm use in order to max profit?

To max profit $MC = P$

$\therefore \frac{q}{12} = 3 \Rightarrow \therefore q = 36$

and $L = \frac{q^2}{144} \quad \therefore L = \frac{(36)^2}{144} = \frac{1,296}{144} = 9$

$\{L = 9\}$

$TR = q \cdot P = \frac{q^2}{12}$

$\therefore q \le 36$

∴ firm must use 9 units of labor to Max. profit.

Question #2 (16 points) (show your work)

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A representative firm in a competitive industry has total cost function is given by: $TC = \frac{1}{3}q^3 - 5q^2 + 30q + 8$

1. Find AVC and MC when the firm produces 12 units of output.

$V.C = \frac{1}{3}q^3 - 5q^2 + 30q$

$\therefore AVC = \frac{1}{3}q^2 - 5q + 30$, At $q = 12 \Rightarrow AVC = \frac{1}{3}(144) - [5 * 12] + 30$

$= 48 - 60 + 30 = 18$

$MC = q^2 - 10q + 30$, At $q = 12 \Rightarrow \therefore MC = (12)^2 - [10 * 12] + 30$

$= 144 - 120 + 30$

$= 54$

2. If the market price is $54, how many units should the firm produce in order to max profit? What would be the firm's profits at this price

In a Competitive Industry: $MR = P$ | $MC = \frac{\partial TC}{\partial q} = q^2 - 10q + 30$

$\therefore q^2 - 10q + 30 = 54 \Rightarrow q^2 - 10q - 24 = 0 \Rightarrow (q+2)(q-12) = 0$

$\therefore q = 12$ or $q = -2$

$\therefore$ must produce $q = 12$ to max profit.

$TR = P \cdot q = 54q$ | $\Pi = TR - TC \Rightarrow \Pi = 54q - \frac{1}{3}q^3 + 5q^2 - 30q - 8 \Rightarrow \Pi = 24q - \frac{1}{3}q^3 + 5q^2 - 8$

Π at $q = 12$: $= 5(24)\cdot 12 - \frac{1}{3}(12)^3 + 5(12)^2 - 8 = 288 - \frac{1}{3}(1,728) + 720 - 8 = 288 - 576 + 720 - 8$

$= \$424$

3. Calculate the shutdown price? What would be the firm's profits or losses at this price?

shut down price

$MC = AVC \Rightarrow \frac{1}{3}q^2 - 5q + 30 = q^2 - 10q + 30$

$\therefore \frac{2}{3}q^2 - 5q = 0 \Rightarrow$

$\Rightarrow q(\frac{2}{3}q - 5) = 0 \Rightarrow q = 0$ or $q = \frac{5*3}{2}$

$\therefore q = 7.5$

≈ 8 units

$\therefore$ Shut down price $\Rightarrow = \$(8)^2 - 80 + 30$

$= 64 - 80 + 30$

$= \$14$

$P = 11.25$

$\therefore$ Losses $= F.C$

$= 8$

Question #3(15 points)

Suppose that a firm's production function of output Q is a function of only two inputs, labor *(L)* and capital *(K)* and can be written *as:* $q\ (L, K) = \sqrt{K} + \sqrt{2L}$

1. Does this production function exhibit constant, increasing, or decreasing returns to scale? Explain.

$q(2L, 2K) = \sqrt{2K} + \sqrt{2(2L)}$

$= \sqrt{2}\cdot\sqrt{K} + \sqrt{2}\cdot\sqrt{2L}$

$= \sqrt{2}\left(\sqrt{K} + \sqrt{2L}\right)$

$= \sqrt{2}\cdot q$

$= 1.4q$

∴ when inputs double → output less than double

∴ decreasing returns to scale

2. What is the MPL? What is the MRTS

$q = \sqrt{K} + (2L)^{\frac{1}{2}}$

$MPL = \frac{\partial q}{\partial L} = 2\left[\frac{1}{2}(2L)^{-\frac{1}{2}}\right] = \frac{2}{2\sqrt{2L}}$ ∴ $MPL = \frac{1}{\sqrt{2L}}$

$MPK = \frac{\partial q}{\partial K} = \frac{1}{2\sqrt{K}}$

$MRTS = \frac{MPL}{MPK} = \frac{\frac{1}{\sqrt{2L}}}{\frac{1}{2\sqrt{K}}} = \frac{1}{\sqrt{2L}} \cdot \frac{2\sqrt{K}}{1}$ → $MRTS = \frac{2\sqrt{K}}{\sqrt{2L}}$

3. Does this production function exhibit diminishing marginal returns? Explain.

$MPL = \frac{1}{\sqrt{2L}}$, So when Labor input increased LA than, MPL decrease (MPL ↓)

So, when LA (the output from increase in labor decrease)

So, production function has diminishing marginal returns.

LA → Additional output decrease, ⇒ diminishing MP$_L$ and

4. Suppose that the wage rate for labor be $w = 8$ and the rental rate of capital be $r = 4$. If the firm produces 20 units of output, how many units of labor will it use?

① $\frac{MPL}{MPK} = \frac{w}{r}$ ⇒ $\frac{2\sqrt{K}}{\sqrt{2L}} = \frac{8}{4}$ ⇒ $\frac{2\sqrt{K}}{\sqrt{2L}} = \frac{2}{1}$ ⇒ $\frac{\sqrt{K}}{\sqrt{2L}} = \frac{1}{2}$ ①

② $20 = \sqrt{K} + \sqrt{2L}$ ⇒ $\sqrt{2L} = 20 - \sqrt{K}$ ②

① in ②

$\frac{\sqrt{K}}{20 - \sqrt{K}} = \frac{1}{2}$ ⇒ $4\sqrt{K} = 20 - \sqrt{K}$

$\therefore 5\sqrt{K} = 20$

$\sqrt{K} = 4$

$\therefore K = 16$

$\therefore 20 = 4 + \sqrt{2L}$ ⇒ $16 = \sqrt{2L}$ ⇒ $2L = 256$

$L = 128$