M COM ENTRANCE

BUSINESS MATHEMATICS PRACTICE QUESTIONS

CH 5: PARTIAL DIFFERENTIATION

1. If demand functions for two commodities X and Y are given by:

$$x = f(p, q) \text{ and } y = f(p, q)$$

where p is the price of good X and q is the price of good Y.

The goods X and Y are complementary if:

A direct partial elasticities are positive

B cross partial elasticities are positive

C direct partial elasticities are negative

D cross partial elasticities are negative

2. Given the production function $Q(K, L) = K^2 + 2K + 3L^2$, the MRTS when K = 3 and L = 1.5 is:

A 1.125

B 0.888

C 0.589

D None of these

3. At a certain factory, daily output is $Q = f(L, K) = 40\ L^{3/4}\ K^{1/2}$, where L indicates the size of labour force and K denotes the capital investment. This relationship shows:

A Increasing Returns to a Factor

B Increasing Returns to Scale

C Decreasing Return to a Factor

D Decreasing Returns to Scale

4. For a production function

$$Z = f(x, y)$$

If $A = f_{xx}(a, b)$, $B = f_{xy}(a, b)$, $C = f_{yy}(a, b)$ and a, b are the critical points. The function has saddle point when :

A $AC - B^2 > 0$

B $AC - B^2 < 0$

C $AC - B^2 = 0$

D $AC - B^2 > 0$ and $A < 0$

5. The degree of the homogeneous function $z = \frac{x^2 + y^2}{xy}$ is:

A 3

B 2

C 1

D 0

6. If $f(x, y) = 2x^2y + xy^2 - y^3$, then according to Euler's theorem: $f(\lambda x, \lambda y) = \lambda^n f(x, y)$. Here n is:

A 2

B 3

C 0

D any positive integer

7. The production function for a commodity is: $Q = 8LK - L^2 - K^2$, where L is labour, K is capital and Q is production. If 10 units of capital are used, what is the upper limit for use of labour which a rational producer will never exceed?

A 20

B 30

C 40

D 50

8. The most correct statement explaining the nature of Cobb-Douglas production function $Z = AL^{\alpha}K^{\beta}$ is that it is a:

A Linear homogeneous production function

B Non-linear homogeneous production function

C Homogeneous production function of degree $\alpha + \beta$

D Homogeneous production function

9. Given the production function $Q = f(L, K) = 27L^{2/3}K^{1/3}$. As L is increased, marginal product of labour:

A increases

B decreases

C remains same

D is zero

10. The production function $Q = f(L, K) = 27L^{2/3}K^{1/3}$ exhibits

A increasing returns to scale

B decreasing returns to scale

C constant returns to scale

D Any of these

11. Given the production function $Q = f(L, K) = 27L^{2/3}K^{1/3}$. If each factor is paid a price equal to its marginal product, the total reward:

A equals total output Q

B is more than total output Q

C is less than total output Q

D has no relation with the output

12. The degree of homogeneity of the production function $X = (AL^6 + BK^6)^{1/3}$ is:

A 6

B 3

C 2

D 1

13. Price of a commodity X is p while that of another commodity Y is q. Their respective demand functions are:

$$x = 4e^{-p/100q} \text{ and } y = 8e^{-q/200p}$$

The two commodities are:

A luxuries

B complements

C necessities

D substitutes

14. The demand D of passenger automobiles is given by $D = 0.90\ I^{2.8}\ p^{-1.2}$ where I is the income and p is the price per car. Find the income elasticity of demand.

A 1.2

B –1.2

C 0.9

D 2.8

15. For the production function $x = f(l, k) = (al^2 + bk^2)^{1/4}$ where x, l and k are the units of output, the reward to factors of production as per their marginal productivity will be:

A Half of the total output

B Twice the total output

C Same as the total output

D Has no relation with total output

16. Two products are complementary in relationship when :

A e_{11} and e_{22} are negative, and e_{12} and e_{21} positive

B e_{11} and e_{22} are negative, and e_{12} and e_{21} negative

C e_{11} and e_{22} are positive, and e_{12} and e_{21} positive

D e_{11} and e_{12} are negative, and e_{22} and e_{21} positive

17. The production function for a commodity is: $Q = 10L - 0.1\ L^2 + 4K - 0.2K^2 + 2KL$, where L is labour, K is capital and Q is production. If 10 units of labour are used, what is the upper limit for use of capital which a rational producer will never exceed?

A 60

B 10

C 80

D 50

18. The demand for coffee is given by $Q = 2500 - 5p + 25q + 0.1Y$. The income elasticity of demand for Y(income) = Rs.10,000, p (price of coffee) = Rs.200 and q (price of tea) = Rs.100 is:

A 0.1

B 0.2

C 1.0

D 2.0

19. Demand laws for two commodities x_1 and x_2 are given by:

$$x_1 = p_1^{-1.7} p_2^{0.6} \quad \text{and} \quad x_2 = p_1^{0.4} p_2^{-0.8}$$

The cross partial elasticities are:

A 0.8 and 0.7

B 0.6 and 0.4

C –0.8 and –0.7

D –1.7 and –0.8

20. If $z = f(x, y) = -x^3 + 27x - 4y^2$, saddle point of the function is:

A (3, 0)

B (–3, 0)

C (0, 3)

D (0, –3)

21. Demand function of a commodity X is given by:

$$D(x) = 300 - \frac{p_x^2}{2} + \frac{p_y}{50} + \frac{Y}{20}$$

where p_x is the price of the commodity X, p_y is the price of a related commodity Y and Y is the income of the consumer. When $p_x = 10$, $p_y = 15$ and Y = 300, the cross elasticity is:

A 0.05

B 0.5

C 5.0

D 5.5

22. A discriminating monopolist faces demand functions $p_1 = 100 - x_1$ and $p_2 = 84 - x_2$ in Market I and Market II respectively. Here p_1 and x_1 are price charged and quantity sold in Market I while p_2 and x_2 are the price charged and quantity sold in Market II respectively. If the monopolist's cost function is $C = 600 + 4(x_1 + x_2)$, find how much should be sold in each market to maximize profit.

A $x_1 = 44$, $x_2 = 44$

B $x_1 = 40$, $x_2 = 48$

C $x_1 = 48$, $x_2 = 40$

D $x_1 = 45$, $x_2 = 43$

23. The output function at a factory is $Q = 40L^{3/4}K^{1/2}$. If the capital (K) and labour (L) are increased by 4%, the percentage increase in output is:

A 4.0%

B 5.0%

C 6.0%

D 6.3%

24. A manufacturer's production function is $Q = 20L^{0.7}K^{0.3}$. The marginal productivity of capital when L= 1 and K = 1 is:

A 6

B 10

C 12

D 14

25. For the production function $X = aL + bK$, the sum of L times the marginal product of labour (L) and K times the marginal product of capital (K) is:

A X

B 2X

C X^2

D $X + a + b$