UNIVERSITY OF CALICUT
SCHOOL OF DISTANCE EDUCATION

B.A. ECONOMICS
(2011 Admission onwards)

III Semester
Complementary Course

MATHEMATICS FOR ECONOMIC ANALYSIS II

Question Bank & Answer Key

Choose the correct Answer from the bracket.

1. $\lim_{x\to\infty} x^2$ is

   (a) -5 (b) 5 (c) -25 (d) 25

2. $\lim_{x\to\infty} \frac{x^2+1}{x^2-1}$ is

   (a) 0 (b) 1 (c) $\propto$ (d) *None of these*

3. If there is no break in the curve the function is called

   (a) Implicit function (b) Explicit Function
   (c) Continous function (d) Smooth function

4. Which one of the following is not a condition for continuity of a function

   (a) $f(x) exist\ at\ x = a$ (b) $\lim_{x\to a} f(x)$ exists

   (c) $\lim_{x\to a} = f(a)$ (d) $\lim_{x\to a} f(x) = f(a)$

5. The function $f(x) = \frac{x^2+3x-4}{x-1}$ is an example of

   (a) *Continuous function* (b) *Discontinous function*
   (c) Implicit function (d) None

6. Slope of a curvilinear function is
   (a) Same at all point (b) Different at different point
   (c) Increase with increase in x (d) Increase at diminishing rate

7. A function is 'differentiable' at a point if
   (a) *Derivation exist at that point* (b) *Function is continous*
   (c) *Function is single valued* *(d) None of these*

8. Which are of the following is not a notation of derivative if $y = f(x)$
   (a) y' (b) $f'(x)$ (c) $D \times [f(x)]$ (d) $\frac{dx}{dy}$

9. Derivative of 'a' if 'a' is a constant is
   (a) a^2 (b) $\sqrt{a}$ (c) a (d) 0

10. Derivative of x^{-4} is
   (a) $-4x^{-3}$ (b) $\frac{-4}{x^5}$ (c) $-4x^3$ (d) $4x^3$

11. If $u = f(x)$ and v = $g(x)$ then u.v is _____
   (a) $\frac{d}{dx}$u.$\frac{d}{dx}$v (b) $n\frac{dv}{dx} + v\frac{du}{dx}$ (c) $\frac{du}{dx} + \frac{dv}{dx}$ (d) $\frac{v\frac{du}{dv} - u\frac{dv}{dx}}{v^2}$

12. If $u = f(x)$ and $v = g(x)$, then $\frac{dy}{dx}\left(\frac{u}{v}\right)$ equal
   (a) $\frac{\frac{vdu}{dx} - \frac{udv}{dx}}{v^2}$ (b) $\frac{d}{dx}u - \frac{d}{dx}v$ (c) $\frac{du}{dx} \div \frac{dv}{dx}$ (d) *None of these*

13. If $y = e^x$ then the $\frac{dy}{dx}$ is
   (a) xe^{x-1} (b) xe (c) ex^{-1} (d) e^x

14. The derivative of $y = e^{x^2}$ is value of x is
   (a) $2\,e^x$ (b) e^{x^2} (c) $e^{x^2}.2x$ (d) $x^2e^{x^2-1}$

15. The derivative of $\log x$ if $x = 10$ equal
   (a) $\frac{1}{x}$ (b) $\frac{1}{10}$ (c) $\sqrt{x}$ (d) $\sqrt{10}$

16. $\frac{dy}{dx}$ of the function $y = x^4$ is $4x^3$ then $\frac{dx}{dy}$ equals

(a) $1/4x^3$ (b) $3x^4$ (c) $12x^2$ (d) *None of these*

17. The slope and rate of change of the first derivative is measured by

(a) *Maximum* (b) *minimum* (c) *second derivative* (d) *Optimum value*

18. If $y = 3x^2+5$ $f'''(x)$ is

(a) 6 (b) 0 (c) $6x$ (d) $6x + 5$

19. An equation which does not directly express 'y' in terms of 'x' is called

(a) *derivative of a function* (b) *Explicit function*
(c) Implicit function (d) Common function

20. If $f(x_1) \leq f(x_2)$ and $x_1 < x_2$ then the function is

(a) Increasing function (b) Decreasing function
(c) Curve function (d) Convex function

21. A function $y = f(x)$ is decreasing if

(a) $x_1 < x_2$ and $f(x_1) \leq f(x_2)$
(b) $x_1 > x_2$ and $f(x_1) \leq f(x_2)$
(c) $x_1 < x_2$ and $f(x_1) \geq f(x_2)$
(d) $x_1 > x_2$ and $f(x_1) \geq f(x_2)$

22. A function that increases or decreases over its entire domain is called

(a) *Inceasing function* *(b) Decreasing function*
(c) *Constant function* *(d) Monotonic function*

23. If the graph of the function lies completely below its tangent line the function is

(a) *Convex function* *(b) Concave function*
(c) *Increasing function* *(d) Decreasing function*

24. Condition for concavity of a function in a given interval is

(a) $f'(x) < 0$ (b) $f'(x) > 0$ (c) $f''(x) > 0$ (d) $f''(x) < 0$

25. A function is convex if the graph of the function lies completely.

(a) Below tangent line (c) Above tangent line
(c) Coincide tangent line (d) None of these

26. If the second derivative of *f(x)* is positive then the function is said to be

(a) $Increasing$ (b) $Decresing$ (c) $Convex$ (d) $Concave$

27. A point in the domain of a function where the derivative equals zero or undefined is called

(a) $Maximum$ (b) $Minimum$ (c) $critical\ Value$ (d) $Infexion\ point$

28. The curve of $y = 2x - 3 + {}^{1}/_{x}$ at all positive value of $'x'$ is

(a) $increasing$ (b) $decreasing$ (c) $convex$ (d) $concave$

29. If the second derivative of a function is equal to zero, then the function at that point is .

(a) $point\ of\ infection$ (b) $Increasing$ (c) $decreasing$ (d) $convex$

30. The point of inflection is a point where the graph of the function changes

(a) From convex to concave (b) Concave to convex
(c) Convex to concave or concave to convex (d) Any of the above

31. In the point of inflection the second derive of the function is

(a) $Positive$ (b) $zero$ (c) $Negative$ (d) $Infinite$

32. Without graphing the function we can obtain a good picture of graph of function using

(a) First derivative (b) Second derivative
(c) Both first and second derivative (d) None of these

33. If *f "(x)* does not exist, then the second derivative

(a) May be negative (b) May be zero
(c) Must be negative (d) Must be zero

34. If the function R = 15Q - Q^2, then AR is

(a) $15 - Q$ (b) $15 - 2Q$ (c) $15Q - Q$ (d) $15Q - 2Q$

35. The total cost function C = $\frac{1}{2}Q^2$+ 50, then the MR at Q = 10 is

(a) 100 (b) 50 (c) 150 (d) 60

36. The first derivative of total cost function is .

(a) $AC\ function$ (b) $MC\ function$ (c) $VC\ function$ (d) $Fixed\ cost\ function$

37. The Profit function is obtained from

(a) Total cost function
(b) Total Revenue function
(c) Both TC and TR function
(d) None of these

38. A firm is in equilibrium when

(a) $MR = MC$ (b) $MR > MC$ (c) $MC > MR$ (d) $AC = AR$

39. If TC = Q^3- 10Q^2 + 50Q, then the AC is minimum at Q.

(a) 10 (b) 50 (c) 60 (d) 5

40 If MC = MR = AR = AC = P, the market is known as.

(a) Perfectly competitive
(b) Monopoly
(c) Monopolistic competition
(d) Oligopoly

41. The limiting value of $\frac{9-x^2}{3-x}$ as 'x' approaches 3 is

(a) $\propto$ (b) 6 (c) 9 (d) 12

42. The function $y = {}^{-}x$ is .

(a) $increasing$ (b) $decreasing$ (c) $stationary$ (d) $none\ of\ these$

43. The derivative with respect to 'x' of the implicit function x^2y^2= 1 is

(a) $-y/x$ (b) $-x/y$ (c) x^2/y^2 (d) y^2/x^2

44. The first derivative of $x + 1/x$ is

(a) $1 - 1/x^2$ (b) $1 + 1/x^2$ (c) $1/x$ (d) $-1/x^2$

45. $\frac{d}{dx}\left(\frac{-1}{x}\right)$ is

(a) $1/x^2$ (b) $-1/x^2$ (c) $1/x$ (d) x

46. The minimum of the function $y = 4x^2 + 8$ is at

(a) $x = 8$ (b) $x = 8x$ (c) $x = 0$ (d) $x = 4$

47. If $T = 5 + 4x + 6x^2$ be the cost function, then the slope of the average cost be:

(a) $4 + 6x$ (b) $5x + 4x^2 + 6x^3$ (c) $4 + 12x$ (d) $\frac{-5}{x} + 6$

48. If $y = \sqrt[3]{x}$, then $\frac{dy}{dx}$ is

(a) $3x$ (b) $1/3\,x$ (c) $1/3\,x^{-2/3}$ (d) $2/3\,x^{1/3}$

49. The value of $\lim_{x\to 0} 10x^2 + 5x + 5$ is

(a) 0 (b) 5 (c) 10 (d) $\propto$

50. If $f(x) = x$, then the derivative of 'y' with respect to x is

(a) x (b) 0 (c) 1 (d) $f(x)$

51. If 'a' is a constant $\lim_{x\to k} a$ equal

(a) a (b) k (c) ka (d) x

52. Which of the following function is an example of continuous function

(a) $\lim_{x\to} \frac{x^2-1}{x-1}$ (b) $\lim_{x\to 1} \frac{x^2+3x-4}{x-1}$ (c) $\lim_{x\to\propto} \frac{x^2-1}{x^2-1}$ (d) $\lim_{x\to 2} \frac{x^2-1}{x-1}$

53. In a set theory, the set of numbers 1, 3, 5, 7, 9 ….. can be represented by A-$\{X: X\ is\ an\ odd\ integer\}$ is a _____ method.

(a) *Linear function* (b) *Curvilinear function*
(c) *Monotonous function* (d) *None of the above*

54. If the first derivative of a function is zero then the function is
(a) $zero\ function$ (b) $Implicit\ function$
(c) *Constant function* (d) *Polynomial function*

55. The derivative of *log x* is
(a) $\log x$ (b) $\frac{1}{\log x}$ (c) $\frac{1}{x}$ (d) $logx^{-1}$

56. If $y = f(x) = log\ x$ then $f''(x)$
(a) $1/x$ (b) $-1/x$ (c) $1/x^2$ (d) $-1/x$

57. The sufficient condition for maximum and minimum is
(a) First order condition (b) $second\ order\ condition$
(c) Higher order condition (d) $None\ of\ these$

58. A function is said to be maximum at $x = a$ if
(a) $\frac{dy}{dx} > 0$ (b) $\frac{dy}{dx} < 0$ (c) $\frac{d^2y}{dx^2} > 0$ (d) $\frac{d^2y}{dx^2} < 0$

59. a function is said to be minimum at $x = a$ if
(a) $\frac{d}{dx} > 0$ (b) $\frac{dy}{dx} < 0$ (c) $\frac{d^2y}{dx^2} > 0$ (d) $\frac{d^2y}{dx^2} < 0$

60. At $x = 1$ the function $y = 3x^2 - 6x + 10$ attain
(a) *maximum* (b) *minimum*
(c) *Inflection point* *(d) monotonous*

61. A determinant composed of all the second-order partial derivatives, with the second-order direct partials on the principal diagonal and the second-order cross partials off the principal diagonal, and which is used to second order condition of optimization is called
(a) Jacobian determinant (b) Hessian determinant
(c) discriminant (d) none of these

62. A positive definite Hessian fulfills the second-order conditions for
(a) maximum (b) minimum
(c) both maximum and minimum (d) minimax

63. A negative definite Hessian fulfills the second order conditions for
(a) maximum (b) minimum
(c) both maximum and minimum (d) minimax

64. U = f(q1, q2) is the utility function f1 = $\frac{\partial u}{\partial q_1}$; f2 = $\frac{\partial u}{\partial q_2}$ then MRS is given by

(a) $\frac{f_1}{f_2}$ (b) f1 – f2 (c) f1 + f2 (d) - $\frac{f_1}{f_2}$

65. When AR = 20 and MR = -60, the price elasticity of demand is

(a) ¼ (b) – ½ (c) 40 (d) 80

66. Derivative of a sum of two functions is equal to
(a) sum of their derivatives (b) product of their derivatives
(c) first function x derivative of 2nd function (d) none of the above

67. Definite integral is defined as
(a) The value of the integral at the upper limit less its value at the lower limit
(b) The value of the integral at the upper limit plus its value at the lower limit
(c) The value of the integral at the lower limit less its value at the upper limit
(d) The value of the integral at the upper limit multiplied by its value at the upper limit

68. The derivative of a constant is equal to
(a) 0 (b) 1 (c) -1 (d) A positive number if the constant is positive

69. The partial derivative of a function z = 2x + 5y + 6xy with respect to x is
(a) 5 + 6y (b) 2 + 6y (c) 2 + 5y (d) 2 + 6x

70. The cross partial derivative of the function z = 8x2 + 9xy + 120 is
(a) 10 (b) 9 (c) 8 (d) 120

71. The direct second order partial derivative with respect to y of the function z= 85y + 75x is
(a) 1 (b) 0 (c) 2 (d)85

72. By Young's theorem, if both cross partial derivatives are continuous, they will be
(a) different (b) not exist (c) identical (d) none of these

73. For a multivariable function to be at a relative minimum
(a) first order partial derivatives must equal zero simultaneously
(b) second order direct partial derivatives must be positive
(c) product of second order direct partial derivatives must exceed product of cross partial derivatives
(d) all the above

74. If the product of second order direct partial derivatives is less than the product of cross partial derivatives, and both the direct partial derivatives have the same signs, the function is at
(a) inflection point (b) saddle point
(b) inconclusive (c) all the above

75. In the Lagrange function, λ represents
(a) constraint (b) Lagrange multiplier
(c) objective function (d) none of these

76. Lagrange multipliers are often referred to as
(a) shadow prices (b) constraint prices
(c) optimum value (d) none of these

77. Given y = 5x2 + 3x + 20, the differential dy is
(a) (4x + 5) dx (b) (10x + 3) dx
(c) (5x + 3) dx (d) (5 + 3x) dx

78. For a function of two or more independent variables, the total differential measures
(a) change in the dependent variable brought about by a small change in each of the independent variables
(b) change in the independent variable brought about by a small change in each of the dependent variables

(c) total change in the independent variable
(d) none of these

79. Given z = 2x4 + 16xy + 9y2, the total differential is
(a) *(8x3 + 16y)dx + (16x + 18y)dy* (b) *(4x3 + 8y)dx + (8x + 9y2)dy*
(c) *(8x3 + 16y)dx* (d) *(16x + 18y)dy*

80. A partial differential measures the change in the
(a) dependent variables resulting from a small change in one of the independent variables and assumes the other independent variables are constant
(b) independent variables keeping dependent variable constant
(c) dependent variables due to a change in all the independent variables
(d) none of these

81. Given $z = f(x, y)$ and $y = g(x)$, the total derivative of z with respect to x measures
(a) the direct effect of y on z
(b) the direct effect of x on z plus the indirect effect of x on z through y
(c) the direct effect of x on z only
(d) the indirect effect of x on z through y

82. Given z = 8x + 6y and y = 4x, the total derivative of z with respect to x is
(a) 23 (b) 32 (c) 64 (d) 8

83. Which of the following is an example for implicit function?
(a) y = 2x + 5 (b) 8x2 + 10xy + 5 = 0 (c) x = 9y + 10 (d) none of these

84. The marginal product of input K, given the production function Q = 10 KL – 4K2 – 5L2 is
(a) 10L – 8K (b) 10 L – 4K (c) -8K (d) 4 – 5L

85. Given the demand function Q1 = 6 – 5 P1 + 2 P2 + 10 Y where Y = income, the income elasticity of demand is
(a) 20 (b) 10 Y/Q1 (c) 2Y/Q1 (d) -5Y/Q1

86. Given the demand function Q1 = 6 – 5 P1 + 2 P2 + 10 Y where P2 = price of the substitute good, the cross elasticity of demand is
(a) 6P2/Q1 (b) -5 P2/Q1 (c) 2 P2/Q1 (d) 10 P2/Q1

87. Reversing the process of differentiation and finding the original function from the derivative is called
    (a) integration (b) antidifferentiation
    (c) both (a) and (b) (d) none of these

88. The integral of a constant K is
    (a) K (b) K x + c (c) 0 (d) cannot be determined

89. The integral of x-1 is
    (a) x + c (b) x (c) ln x + c (d) none of these

90. The integral of the sum of two or more functions equals
    (a) the sum or difference of their integrals
    (b) the sum of their integrals
    (c) the difference of their integrals
    (d) none of these

91. The integral of the negative of a function equals
    (a) the negative of the integral of that function
    (b) the integral of that function itself
    (c) inverse of that function
    (d) none of these

92. The integral of a constant times a function equals
    (a) the constant itself (b) the function itself
    (c) zero (d) constant times the integral of the function

93. The integral of 6x5 is
    (a) x6 + c (b) 1/6 x6 + c (c) x5 + c (d) x + c

94. The area under a graph of a continuous function can be expressed using
    (a) definite integral (b) indefinite integral (c) derivative (d) differential

95. The value of $\int_1^4 10x\,dx$ is
    (a) 85 (b) 75 (c) 65 (d) 55

96. If the upper limit of integration equals the lower limit of integration, the value of the definite integral is
(a) 1 (b) 0 (c) 2 (d) 3

97. Reversing the order of the limits
(a) changes the sign of the definite integral (b) changes the value of the integral
(c) not affects value or sign of definite integral (d) all the above

98. Given the demand function P = 42 – 4Q, and equilibrium price of 2, the consumers' surplus is
(a) 300 (b) 400 (c) 200 (d) none of these

99. An equation which expresses an explicit or implicit relationship between a function and one or more of its derivatives or differentials is called
(a) integral equation (b) differential equation
(c) implicit equation (d) none of these

100. Integration with respect to one independent variable at a time while holding constant the other independent variables is called
(a) partial integration (b) total integration
(c) successive integration (d) absolute integration

101. Which of the following consist of first order partial derivative
A. Hessian
B. Discriminant
C. Determinant
D. Jacobian

102. Optimisation refers to
A. Minimisation
B. Maximisation
C. Minimisation or maximisation
D. None of the above

103. In the constrained optimisation the symbol λ refers to
A. Hessian
B. Multiplier
C. Lagrange multiplier
D. Discriminant

104. When the determinant of a matrix is zero, the matrix is called
    A. Singular
    B. Non singular
    C. Null
    D. Identity

105. In the discriminant, the coefficients of the squared terms are placed
    A. Rows
    B. Columns
    C. Diagonal
    D. Off-diagonal

106. Given C is 3x2 matrix and D is 2x3, the matrix CD will be
    A. 2x2
    B. 2x3
    C. 3x3
    D. 3x2

107. If the two rows of a matrix is dependent , the determinant is
    A. One
    B. Infinity
    C. Undefined
    D. Zero

108. When the Jacobian is found out to be zero then,
    A. Equations are dependent
    B. Equations are independent
    C. Cannot solve
    D. Indeterminate

109. For a matrix minor M_{23}=-56, then the cofactor C_{23} will be
    A. 56
    B. 28
    C. -56
    D. 0

110. The linear form AX= B implies that
    A. $X= A^{-1}B$
    B. $X=B^{-1}A$
    C. X=AB
    D. $X=BA^{-1}$

111. The determinant is defined only for

A. Row matrix
B. Column matrix
C. Square matrix
D. Null matrix

112. Matrix B is called Skew symmetric if

A. $B=B^T$
B. $B=B^2$
C. $B=-B^T$
D. None of the above

113. Hessian composed of

A. First order partial derivatives
B. Second order partial derivatives
C. First order total derivatives
D. Second order total derivatives
E. Answer B Second order partial derivatives

114. If the two matrices are of the order mxn and nxp, then AB will of the dimension

A. pxn
B. mxp
C. nxp
D. mxn

115. If $A=A^2$, the matrix A is known as

A. Symmetric
B. Skew Symmetric
C. Idempotent
D. Triangular

116. If AxA = A, then the matrix A is

A. Nil potent
B. Symmetric
C. Triangular
D. Identity

117. If the determinant of a matrix is found out to be -65, the determinant of its transpose is

A. -65
B. 65
C. 32.5
D. Cannot say

118. In Hessian determinant cross partials are the same following
    A. Young Theorem
    B. Gauss Theorem
    C. Crammers Rule
    D. None of the above

119. The determinant of 2x2 matrix is called
    A. First order determinant
    B. Second order determinant
    C. Third order determinant
    D. Fourth order determinant

120. A matrix with equal number of rows and column is called
    A. Square matrix
    B. Row matrix
    C. Column matrix
    D. Null matrix

121. If the bordered hessian is found out to be positive, the function is
    A. Maximised
    B. Minimised
    C. Maxima or minima
    D. Cannot say

122. A diagonal matrix with each of the diagonal elements is unity is
    A. Vector
    B. Square matrix
    C. Diagonal matrix
    D. Identity matrix

123. If all the principal minors of Hessian is positive, then Hessian is
    A. Positive definite
    B. Negative definite
    C. Positive or Negative Definite
    D. Cannot say

124. The maximum number of linearly independent rows or columns in the matrix is called
    A. Determinant
    B. Trace
    C. Rank
    D. Minor

125. The determinant of the triangular matrix is the product of
    A. Rows
    B. Columns
    C. Rows and columns
    D. Diagonals

126. Minor with the prescribed sign is called
    A. Inverse
    B. Cofactor
    C. Determinant
    D. Adjoint

127. The determinant of a quadratic form is
    A. Cofactor
    B. Jacobian
    C. Hessian
    D. Discriminant

128. For a square matrix, inverse exists if and only if it is
    A. Non-singular
    B. Singular
    C. Null
    D. Cannot say

129. If the bordered hessian is negative, the function is
    A. Maximum
    B. Minimum
    C. Equalised
    D. Solved

130. The sufficient condition for utility maximisation implies that the bordered hessian determinant of the utility function is
    A. Positive
    B. Negative
    C. Zero
    D. Cannot say

ANSWER KEY

1. (d) 25
2. (b) 1
3. (c) Continuous function
4. (c) $\lim_{x \to a} = f(a)$
5. (b) discontinuous function
6. (b) different at different point
7. (a) derivative exist at that point
8. (d) $\frac{dx}{dy}$
9. (d) 0
10. (b) $-4/x^5$
11. (b) $n\frac{dv}{dx} + v\frac{du}{dx}$
12. (a) $\frac{\frac{vdu}{dx} - \frac{udv}{dx}}{v^2}$
13. (d) e^x
14. (c) $e^{x^2} \times 2x$
15. (b) $1/10$
16. (a) $\frac{1}{4x^3}$
17. (c) Second derivative
18. (b) 0
66. (a) Sum of their derivatives
67. (a) The value of the integral at the upper limit less its value at the lower limit
68. (a) 0
69. (a) 5+6y
70. (b) 9
71. (b) 0
72. (c) identical
73. (d) all the above
74. (a) inflection point
75. (b) Lagrange multiplier
76. (a) shadow prices
77. (b) *(10x +3)dx*
78. (a) change in the dependent variable brought about by a small change in each of the independent variables
79. (a) $(8x^3 +)$dx + (16x + 18y)dy
80. (a) Dependent variables resulting from a small change in one of the independent variables and assumes the other independent variables are constant
81. (b) the direct effect of x on z plus the indirect effect of x on z through y
82. (b) 32
83. (b) $8x^2$+10xy + 5 =0

19. (c) Implicit function
20. (a) increasing function
21. (c) $x_1 < x_2$ and $f(x_1) \geq f(x_2)$
22. (d) Monotonic function
23. (b) Concave function
24. (c) $f''(x) > 0$
25. (b) above tangent line
26. (c) convex
27. (a) Critical value
28. (d) convex
29. (a) point of inflection
30. (d) any of the above
31. (b) zero
32. (c) both first and second derivative
33. (b) may be zero
34. (a) 15 –Q
35. (d) 60
36. (b) Marginal cost function
37. (c) both TC and TR function
38. (a) MR = MC
39. (d) 5
40. (a) Perfectly competitive
41. (b) 6
42. (b) decreasing
43. (a) $-y/x$
84. (a) 10L – 8K
85. (b) $10^{Y}/_{Q1}$
86. (c) $2^{P2}/_{Q1}$
87. (c) both (a) and (b)
88. (b) Kx ÷ c
89. (c) In x ÷ c
90. (b) the sum of their integrals
91. (a) the negative of the integral of that function
92. (d) constant times the integral of the function
93. (c) $x^5 \div c$
94. (a) definite integral
95. (b) 75
96. (b) 0
97. (a) changes the sign of the definite integral
98. (b) 400
99. (b) differential equation
100. (a) partial integration
101 (d) Jacobian
102. (c) Minimisation or maximization
103. (c) Lagrange Multiplier
104. (a) Singular
105. (c) Diagonal
106. (c) 3 × 3
107. (d) zero
108. (a) Equations are dependent

44. (d) $-1/x^2$
45. (a) $1/x^2$
46. (c) x = 0
47. (d) $-5/x + 6$
48. (c) $1/3\, x^{-2/3}$
49. (b) 5
50. (c) 1
51. (a) a
52. (d) $\lim_{x\to 2} \frac{x^2-1}{x-1}$
53. (b) Curvilinear function
54. (c) Constant function
55. (c) $1/x$
56. (b) $-1/x^2$
57. (b) Second order condition
58. (d) $\frac{d^2y}{dx^2} < 0$
59. (c) $\frac{d^2y}{dx^2} > 0$
60. (b) Minimum
61. (a) Jacobian determinant
62 (b) minimum
63. (a) maximum
64. (a) $\frac{f1}{f2}$
65. (a) $1/4$
109. (a) 56
110. (a) X = A^{-1}B
111. (c) Square Matrix
112. (c) B = B^T
113. (b) Second order partial derivatives
114. (b) m × p
115. (c) Idempotent
116. (d) Identity
117. (a) -65
118. (a) Young Theorem
119. (b) Second order determinant
120. (a) Square matrix
121. (a) Maximised
122. (d) Identity matrix
123. (a) Positive definite
124. (c) Rank
125. (d) Diagonals
126. (b) Cofactor
127. (d) Discriminant
128. (a) Non-singular
129. (b) Minimum
130. (a) Positive