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MINIMUM LEARNING MATERIALS

11th Standard

Business Maths

90 x 2 = 180

1) Resolve into partial fractions for the following : $\frac{3x+7}{x^2-3x+2}$

2) Resolve into partial fractions for the following : $\frac{4x+1}{(x-2)(x+1)}$

3) The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.50 & 0.30 \\ 0.41 & 0.33 \end{bmatrix}$. Test whether the system is viable as per Hawkins Simon conditions.

4) Find the locus of a point which is equidistant from (1, 3) and x axis.

5) Find the minors and cofactors of all the elements of the following determinants $\begin{vmatrix} 5 & 20 \\ 0 & -1 \end{vmatrix}$

6) Find $\frac{dy}{dx}$ of the following functions: x = ct, y = $\frac{c}{t}$

7) Find $\frac{dy}{dx}$ of the following functions: x = log t, y = sin t

8) Find $\frac{dy}{dx}$ of the following functions: $x=a\cos^3\theta$, $y=a\sin^3\theta$

9) Find $\frac{dy}{dx}$ of the following functions: x = a (θ - sin θ),y = a(1- cosθ)

10) In how many ways 5 boys and 3 girls can be seated in a row, so that no two girls are together?

11) Find the rank of the word 'CHAT' in dictionary.

12) Find the values of each of the following trigonometric ratios. $\sin 300^o$

13) Find the values of each of the following trigonometric ratios. $\cos(-210^o)$

14) Find the values of each of the following trigonometric ratios. $\tan(-855^o)$

15) Verify that $8C_4 + 8C_3 = 9C_4$

16) Find the equation of the following circles having the centre (0,0) and radius 2 units

17) Find the equation of the circle having (4,7) and (-2,5) as the extremities of a diameter.

18) Find the cartesian equation of the circle whose parametric equations are x = 3 cosθ, y = 3 sinθ $0 \leq \theta \leq 2\pi$

19) Differentiate the following with respect to x. $\sqrt{x} + \frac{1}{\sqrt[3]{x}} + e^x$

20) Differentiate the following with respect to x. $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2$

21) Find the values of the following cot 75°

22) Find the values of the following sin 76° cos 16° + cos 76° sin 16°

23) Find the values of the following $\sin\frac{\pi}{4}\cos\frac{\pi}{12}+\cos\frac{\pi}{4}\sin\frac{\pi}{12}$

24) Find the values of the following $\cos^2 15 - \sin^2 15°$

25) If $\sin A = \frac{3}{5}$ 0 < A < $\frac{\pi}{2}$ and $\cos B = \frac{-12}{13}$, π < B < $\frac{3\pi}{2}$ find the values of the following $\cos(A+B)$

26) Prove that : $\frac{cos2A-cos3A}{sin2A-sin3A} = tan\frac{A}{12}$

27) Prove that: $\frac{cos7A+cos5A}{sin7A-sin5A} = cotA$

28) Evaluate: cos 20° + cos 100° + cos 140°

29) The total cost function for the production of x units of an item is given by $C(x) = \frac{1}{3}x^3 + 4x^2 - 25x + 7$. Find
(i) Average cost function
(ii) Average variable cost function
(iii) Average fixed cost function
(iv) Marginal cost function and
(v) Marginal Average cost function

30) Find the elasticity of supply for the supply function $x = 2p^2 - 5p + 1$, $p > 3$.

31) A demand function is given by $xp^n = k$ where n and k are constants. Prove that elasticity of demand is always constant.

32) A firm produces x tonnes of output at a total cost of $C(x) = \frac{1}{10}x^3 - 4x^2 - 20x + 7$ find the
(i) average cost function
(ii) average variable cost function
(iii) average fixed cost function
(iv) marginal cost function and
(v) marginal average cost function.

33) If the demand law is given by $p = 10e^{-\frac{x}{2}}$ then find the elasticity of demand.

34) Find the elasticity of demand in terms of x for the following demand laws and also find the output (x), when the elasticity is equal to unity.
(i) $p = (a - bx)^2$
(ii) $p = a - bx^2$

35) Show that the function $f(x) = x^3 - 3x^2 + 4x$, $x \varepsilon$ R is strictly increasing function on R.

36) Find the stationary value and the stationary points $f(x) = x^2 + 2x - 5$.

37) Draw the logic network for the following:
Activities C and D both follow A, activity E follows C, activity F follows D, activity E and F precedes B.

38) Develop a network based on the following information:

Activity:	A	B	C	D	E	F	G	H
Immediate predecessor:	-	-	A	B	C, D	C, D	E	F

39) Draw the network for the project whose activities with their relationships are given below:
Activities A, D, E can start simultaneously; B, C > A; G, F > D, C; H > E, F.

40) Draw the event oriented network for the following data:

Events	1	2	3	4	5	6	7
Immediate Predecessors	-	1	1	2,3	3	4,5	5,6

41) Construct the network for the projects consisting of various activities and their precedence relationships are as given below:
A, B, C can start simultaneously A < F, E; B < D, C; E, D < G

42) Construct the network for each the projects consisting of various activities and their precedence relationships are as given below:

Activity	A	B	C	D	E	F	G	H	I	J	K
Immediate Predecessors	-	-	-	A	B	B	C	D	E	H,I	F,G

43) Draw a network diagram for the following activities.

Activity code	A	B	C	D	E	F	G	H	I	J	K
Predecessor activity	-	A	A	A	B	C	C	C,D	E,F	G,H	I,J

44) Draw the network diagram for the following activities

Activity code	A	B	C	D	E	F	G
Predecessor activity	-	-	A	A	B	C	D,E

45) Calculate the correlation coefficient from the following data
$N = 9$, $\Sigma X = 45$, $\Sigma Y = 108$, $\Sigma X^2 = 285$, $\Sigma Y^2 = 1356$, $\Sigma XY = 597$

46) From the following data calculate the correlation coefficient $\Sigma xy = 120$, $\Sigma x^2 = 90$, $\Sigma y^2 = 640$

47) Calculate the coefficient of correlation between X and Y series from the following data.

Description	**X**	**Y**
Number of pairs of observation	15	15
Arithmetic mean	25	18
Standard deviation	3.01	3.03
Sum of squares of deviation from the arithmetic mean	136	138

Summation of product deviations of X and Y series from their respective arithmetic means is 122.

48) Find D_2 and D_6 for the following series 22, 4, 2, 12, 16, 6, 10, 18, 14, 20, 8

49) Find the market value of 325 shares of amount Rs 100 at a premium of Rs 18.

50) If the dividend received from 10% of Rs 25 shares is Rs 2000. Find the number of shares.

51) Find the number of shares which will give an annual income of Rs 3,600 from 12% stock of face value Rs 100.

52) The total cost function for the production of x units of an item is given by c = $10 - 4x^3 + 3x^4$ find the (i) average cost function (ii) marginal cost function (iii) marginal average cost fuction.

53) Find the market value of 62 shares available at Rs 132 having the par value of Rs 100.

54) Find the amount of annuity of Rs 2000 payable at the end of each year for 4 years of money is worth 10% compounded annually [$(1.1)^4 = 1.4641$]

55) Find the first quartile and third quartile for the given observations
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

56) Calculate the correlation coefficient from the following data:
$\Sigma X = 125$, $\Sigma Y = 100$, $\Sigma X^2 = 650$, $\Sigma Y^2 = 436$, $\Sigma XY = 520$, $N = 25$

57) A family has two children. What is the probability that both the children are girls given that at least one of them is a girl?

58) A die is thrown twice and the sum of the number appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once?

59) From a pack of 52 cards, two cards are drawn at random. Find the probability that one is a king and the other is a queen.

60) Let P(A) = $\frac{3}{5}$ and P(B) = $\frac{1}{5}$. Find P(A∩B) if A and B are independent events.

61) A bag contains 5 white and 3 black balls. Two balls are drawn at random one after the other without replacement. Find the probability that both balls drawn are black.

62) A committee of two persons is formed from 3 men and 2 women. What is the probability that the committee will have
(i) No woman (ii) One man (iii) No man

63) Evaluate: $\begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$

64) Evaluate: $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$

65) Solve $\begin{vmatrix} x-1 & x & x-2 \\ 0 & x-2 & x-3 \\ 0 & 0 & x-3 \end{vmatrix} = 0$

66) Show that $\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ is a singular matrix.

67) Show that $\begin{bmatrix} 8 & 2 \\ 4 & 3 \end{bmatrix}$ is non – singular.

68) Find n, if $\frac{1}{9!} + \frac{1}{10!} = \frac{n}{11!}$

69) Evaluate: $8P_3$

70) If $nP_r = 360$, find n and r.

71) If $15C_{3r} = 15C_{r+3}$, find r

72) Find the equation of the circle with centre at (3, –1) and radius is 4 units.

73) Find the equation of the circle when the end points of the diameter are (2, 4) and (3, –2).

74) Find the centre and radius of the circle $x^2 + y^2 - 8x + 6y - 24 = 0$

75) Find the parametric equations of the circle $x^2 + y^2 = 25$

76) Convert : 160^o into radians

77) Convert $\frac{4\pi}{5}$ radians into degree

78) Prove that $\frac{sin(-\theta)tan(90^o-\theta)sec(180^o-\theta)}{sin(180+\theta)cot(360-\theta)cosec(90^o-\theta)} = 1$

79) Find $\sin 105^o + \cos 105^o$

80) Evaluate: $\lim_{x\to 2} \frac{x^2-4x+6}{x+2}$

81) Evaluate: $\lim_{x\to 1} \frac{x^3-1}{x-1}$

82) Differentiate the following functions with respect to x, $x^2 \sin x$

83) If $x = a\,\theta$ and $y = \frac{a}{\theta}$, then prove that $\frac{dy}{dx} + \frac{y}{x} = 0$

84) If $y = A \sin x + B \cos x$, then prove that, $y_2 + y = 0$

85) Differentiate : $\cos x \log x$

86) Find the elasticity of supply for the supply function $x = 2p^2 + 8p + 10$

87) Find the stationary points and stationary values of the function $f(x) = x^3 - 3x^2 - 9x + 5$

88) A person buys a stock for ₹ 9000 at 10 % discount. If rate of dividend is 20 %, find his income.

89) Find the yield on 20 % stock at 25 % discount.

90) Shiva paid ₹ 105 to a broker for buying 70 shares of face value of 100 . Find the rate of brokerage.

91) The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.50 & 0.25 \\ 0.40 & 0.67 \end{bmatrix}$. Test whether the system is viable as per Hawkins-Simon conditions.

92) Evaluate $\begin{vmatrix} 1 & 3 & 4 \\ 102 & 18 & 36 \\ 17 & 3 & 6 \end{vmatrix}$

93) Find the integral value of x if $\begin{vmatrix} x^2 & x & 1 \\ 0 & 2 & 1 \\ 3 & 1 & 4 \end{vmatrix} = 28$

94) Show that $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$

95) Prove that $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix} = xy$

96) Find how many four letter words can be formed from the letters of the word "LOGARITHMS" (words are with or without meanings)

97) Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

98) If $nC_8 = nC_{n-6}$, find nC_2.

99) Find the 10^{th} term in the expansion of $\left(2x^2 + \frac{1}{x}\right)^{12}$

100) Find the middle term in the expansion of $\left(\frac{2}{3}x^2 - \frac{-3}{2x}\right)^{20}$

101) Find the co-efficient of x^{-17} in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$

102) If (n + 3) ! = 56 (n + 1) !, frnd n.

103) Find the equation of tangent at the point (–2, 5) on the circle $x^2 + y^2 + 3x - 8y + 17 = 0$.

104) The supply of a commodity is related to the price by the relation $x = \sqrt{5p - 15}$. Show that the supply curve is a parabola.

105) Find the length of the tangent from (1,2) to the circle $x^2 + y^2 - 2x + 4y + 9 = 0$

106) A point in the plane moves so that its distance from the origin is thrice its distance from the y- axis. Find its locus.

107) Find the locus of the point which is equidistant from (2, –3) and (3, –4).

108) Find the angle between the pair of straight lines $3x^2 - 5xy - 2y^2 + 17x + y + 10 = 0$

109) Show that the point (2,3) lies inside the circle x2 + y2 - 6x - 8y + 12 = 0

110) Find the circumference and area of the circle $x^2 + y^2 - 6x - 8y + 15=0$.

111) Show that $\frac{sin2\theta}{1+cos2\theta} = tan\theta$

112) Express the following as sum or difference 2cos13Asin15A

113) Prove that $\tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) = \tan^{-1}\left(\frac{2}{9}\right)$

114) Prove that $\cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{3}{5}\right) = \cos^{-1}\left(\frac{27}{11}\right)$

115) Simplify : $\sin^{-1}\left(\frac{1}{3}\right) + \sin^{-1}\left(\frac{2}{3}\right)$

116) If $\sin A = \frac{3}{5}$ 0 < A < $\frac{\pi}{2}$ and $\cos B = \frac{-12}{13}$, π < B < $\frac{3\pi}{2}$ find the values of the following $\tan(A - B)$

117) Prove that $\tan^{-1}\left(\frac{4}{3}\right) - \tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{4}$

118) Prove that $\tan^{-1}\left(\frac{m}{n}\right) - \tan^{-1}\left(\frac{m-n}{m+n}\right) = \frac{\pi}{4}$

119) Differentiate the following with respect to x. $(x^2 - 3x + 2)(x + 1)$

120) Evaluate: $\lim_{x\to\infty} \frac{6 - 5x^2}{4x + 15x^2}$

121) Find $\frac{dy}{dx}$ if $x = at^2$, $y = 2at$

122) Find $\frac{dy}{dx}$ if $x = a\cos\theta, y = a\sin\theta$

123) Construct the network for the projects consisting of various activities and their precedence relationships are as given below: A, B can start simultaneously
A < D, E; B < F; E < G, D < C, F < H.

124) A factory produces 2 products P_1 and P_2. Each of the product P_1 requires 2 hours for moulding, 3 hrs for grinding and 4 hours for polishing and each of the product P_2 requires 4 hrs for moulding 2 hrs for grinding and 2 hrs for polishing. The factory has moulding machine available for 20 hrs grinding machine for 24 hrs and polishing machine available for 13 hrs. The profit is ₹ 5 per unit of P_1 and ₹ 3 per unit of P_2 and the factory can sell all that it produces. Formulate the L.P.P to maximize the profit

125) Calculate the coefficient of correlation from the following data:
$\Sigma X = 50$, $\Sigma Y = -30$, $\Sigma X^2 = 290$, $\Sigma Y^2 = 300$, $\Sigma XY = -115$, $N = 10$

126) Obtain the two regression lines from the following data N=20, $\Sigma X=80$, $\Sigma Y=40$, $\Sigma X^2=1680$, $\Sigma Y^2=320$ and $\Sigma XY=480$

127) An unbiased die is thrown. If A is the event 'the number appearing is a multiple of 3' and B be the event 'the number appearing is even' number then

find whether A and B are independent?

128) A person pays Rs 64,000 per annum for 12 years at the rate of 10% per year. Find the annuity [$(1.1)^{12}$ = 3.3184]

129) Find the present value of Rs 2,000 per annum for 14 years at the rate of interest of 10% per annum. If the payments are made at the end of each payment period. [$(1.1)^{-14}$ = 0.2632]

130) What is the amount of perpetual annuity of Rs 50 at 5% compound interest per year?

81 x 3 = 243

131) If the distance of a point from the points (2,1) and (1, 2) are in the ratio 2:1, then find the locus of the point.

132) Find a point on x axis which is equidistant from the points (7, -6) and (3,4)

133) Find the minors and cofactors of all the elements of the following determinants. $\begin{bmatrix} 1 & -3 & 2 \\ 4 & -1 & 2 \\ 3 & 5 & 2 \end{bmatrix}$

134) Solve: $\begin{vmatrix} 2 & x & 3 \\ 4 & 1 & 6 \\ 1 & 2 & 7 \end{vmatrix} = 0$

135) Solve: $\begin{vmatrix} x & 2 & -1 \\ 2 & 5 & x \\ -1 & 2 & x \end{vmatrix} = 0.$

136) Show that $\begin{vmatrix} 0 & ab^2 & ac^2 \\ a^2b & 0 & bc^2 \\ a^2c & b^2c & 0 \end{vmatrix} = 2a^3b^3c^3.$

137) Show that the straight lines x + y - 4 = 0, 3x + 2 = 0 and 3x - 3y + 16 = 0 are concurrent

138) Find x if $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$.

139) Evaluate $\frac{n!}{r!(n-r)!}$ when n = 5 and r = 2

140) How many five digits telephone numbers can be constructed using the digits 0 to 9 if each number starts with 67 with no digit appears more than once?

141) Find the value of 'a' for which the straight lines 3x + 4y = 13; 2x - 7y = -1 and ax - y - 14 = 0 are concurrent

142) Resolve into Partial Fractions : $\frac{5x+7}{(x+1)(x+3)}$

143) Resolve into Partial Fractions: $\frac{x-4}{x^2-3x+2}$

144) Differentiate $\sin^3 x$ with respect to $\cos^3 x$.

145) If $nP_4 = 12(nP_2)$ find n.

146) Find the number of arrangements that can be made out of the letters of the word "ASSASSINATION".

147) If $nP_r = 1680$ and $nC_r = 70$, find n and r.

148) How many chords can be drawn through 21 points on a circle?

149) If $\lim_{x\to a} \frac{x^9-a^9}{x-a} = \lim_{x\to 3}(x+6)$,find the values of a

150) If $\lim_{x\leftarrow 2} \frac{x^n-2^n}{x-2} = 448$,then find the least positive integer n.

151) Find $\frac{dy}{dx}$ of the following functions: $x = a(\theta - \sin\theta)$, $y = a(1 - \cos\theta)$

152) Find the center and radius of the circle $x^2 + y^2 - 22x - 4y + 25 = 0$

153) Find the center and radius of the circle $5x^2 + 5y^2 + 4x - 8y - 16 = 0$

154) If the lines $x + y = 6$ and $x + 2y = 4$ are diameters of the circle, and the circle passes through the point (2, 6) then find its equation.

155) Find y_2 of the following function $x = a\cos\theta$, $y = a\sin\theta$

156) If $y = 500\, e^{7x} + 600\, e^{-7x}$ then show that $y_2 - 49y = 0$.

157) Find the value of P if the line $3x + 4y - P = 0$ is tangent to the circle $x^2 + y^2 = 16$

158) Prove that $\cot 4x(\sin 5x + \sin 3x) = \cot x(\sin 5x - \sin 3x)$

159) Prove that $\tan(-225^o)\cot(-405^o) - \tan(-765^o)\cot(675^o) = 0$

160) Prove that: $\cos 510^o \cos 330^o + \sin 390^o \cos 120^o = -1$

161) If $y = \tan x$, then prove that $y_2 - 2yy_1 = 0$

162) Differentiate the following with respect to x. $e^x \sin x$

163) Differentiate the following with respect to x $e^x(x + \log x)$

164) If $A + B = 45^\circ$, Prove that $(1 + \tan A)(1 + \tan B) = 2$ and hence deduce the value of $\tan 22\frac{1}{2}^\circ$

165) Prove that $\sin(A + 60°) + \sin(A - 60°) = \sin A$.

166) Prove that $\tan 4A \tan 3A \tan A + \tan 3A + \tan A - \tan 4A = 0$

167) If $\tan\theta = 3$, find $\tan 3\theta$

168) If $\sin A = \frac{12}{13}$, find sin 3A

169) If $\sin A = \frac{3}{5}$, find the values of cos 3A and tan 3A.

170) The total cost C in Rupees of making x units of product is $C(x) = 50 + 4x + 3\sqrt{x}$. Find the marginal cost of the product at 9 units of output.

171) For the given demand function $p = 40 - x$, find the value of the output when $\eta_d = 1$

172) Find the elasticity of supply for the supply law $x = \frac{p}{p+5}$ when p = 20 and interpret your result.

173) The total cost of x units of output of a firm is given by c = $\frac{2}{3}x + \frac{35}{2}$ find the
(i) cost, when output is 4 units
(ii) average cost, when output is 10 units
(iii) marginal cost, when output is 3 units

174) Revenue function 'R' and cost function 'C' are R = $14x - x^2$ and C = $x(x^2 - 2)$. Find the
(i) average cost function
(ii) marginal cost function,
(iii) average revenue function and
(iv) marginal revenue function.

175) Find the elasticity of supply for the supply function $x = 2p^2 + 5$ when p = 3

176) Find the equilibrium price and equilibrium quantity for the following functions. Demand: x = 100 – 2p and supply: x = 3p – 50

177) Find the interval in which the function $f(x) = x^2 - 4x + 6$ is strictly increasing and strictly decreasing.

178) Draw a network diagram for the project whose activities and their predecessor relationships are given below:

Activity:	A	B	C	D	E	F	G	H	I	J	K
Predecessor activity:	-	-	-	A	B	B	C	D	F	H,I	F,G

179) Calculate Karl Pearson's coefficient of correlation from the following data:

X:	6	8	12	15	18	20	24	28	31
Y:	10	12	15	15	18	25	22	26	28

180) Calculate the correlation co-efficient for the following data.

X	5	10	5	11	12	4	3	2	7	1
Y	1	6	2	8	5	1	4	6	5	2

181) The following are the ranks obtained by 10 students in Statistics and Mathematics.

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	1	4	2	5	3	9	7	10	6	8

Find the rank correlation coefficient.

182) Calculate rank correlation coefficient of the following data.

Subject 1	40	46	54	60	70	80	82	85	87	90	95
Subject 2	45	46	50	43	40	75	55	72	65	42	70

183) Calculate the value of Q_1, Q_3, D_6 and P_{50} from the following data

Roll No	1	2	3	4	5	6	7
Marks	20	28	40	12	30	15	50

184) Compute Q_1, D_2 and P_{90} from the following data

Marks	10	20	30	40	50	60
No. of Students	4	7	15	8	7	2

185) A man buys 500 shares of amount Rs 100 at Rs 14 below par. How much money does he pay?

186) A person brought at 12% stock for Rs 54,000 at a discount of 17%. If he paid 1% brokerage, find the percentage of his income.

187) Calculate the value of quartile deviation and its coefficient from the following data

Roll No.	1	2	3	4	5	6	7
Marks	20	28	40	12	30	15	50

188) Which is better investment: 12% Rs 20 shares at Rs 16 (or) 15% Rs 20 shares at Rs 24.

189) How much will be required to buy 125 of Rs 25 shares at a discount of Rs 7

190) Which is better investment? 7% of Rs 100 shares at Rs 120 (or) 8% of Rs 100 shares at Rs 135.

191) Which is better investment? 20% stock at 140 (or) 10% stock at 70.

192) Compute coefficient of quartile deviation from the following data

Marks	10	20	30	40	50	60
No. of Students	4	7	15	8	7	2

193) Find Q_1, Q_3, D_8 and P_{67} of the following data :

Siza of shares	4	4.5	5.	5.5	6	6.5	7	7.5	8
Fequency	10	18	22	25	40	15	10	8	7

194) X speaks truth 4 out of 5 times. A die is thrown. He reports that there is a six. What is the chance that actually there was a six?

195) Calculate the mean deviation about median and its relative measure for seven numbers given below: 55, 45, 40, 20, 60, 80, and 30.

196) Calculate the Mean deviation about mean for the following data.

Size	2	4	6	8	10	12	14	16
frequency	2	2	4	5	3	2	1	1

197) Bag I contains 3 red and 4 blue balls while another Bag II contains 5 red and 6 blue balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from second Bag.

198) Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that the problem is

(i) solved

(ii) exactly one of them solves the problem

199) Two urns contains the set of balls as given in the following table

Title	White	Red	Black
Urn 1	10	6	9
Urn 2	3	7	15

One ball is drawn from each urn and find the probability that

(i) both balls are red

(ii) both balls are of the same colour.

200) A die is thrown. Find the probability of getting

(i) a prime number

(ii) a number greater than or equal to 3

201) Gun 1 and Gun 2 are shooting at the same target. Gun 1 shoots on the average nine shots during the same time Gun 2 shoots 10 shots. The precision of these two guns is not the same. On the average, out of 10 shots from Gun 2 seven hit the target. In the course of shooting the target has been hit by a bullet, but it is not known which Gunshot this bullet. Find the chance that the target was hit by Gun 2?

202) Develop a network based on the following information.

Activity	A	B	C	D	B	E
Immediate Predecessor	-	-	A	C	E	F

203) The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.8 & 0.2 \\ 0.9 & 0.7 \end{bmatrix}$ Test whether the system is viable as per Hawkins – Simon conditions.

204) Show that the given lines 3x - 4y - 13 = 0, 8x - 11y = 33 and2x - 3y - 7 = 0 are concurrent and find the concurrent point.

205) How many distinct words can be formed using all the letters of the following words.

MISSISSIPPI

206) How many distinct words can be formed using all the letters of the following words.

MATHEMATICS.

207) If $nC_4 = nC_6$, find $12C_n$

208) If $nP_r = 720$; $nC_r = 120$, find r

209) Prove that $\sin 600^\circ \cos 390^\circ + \cos 480^\circ \sin 150^\circ = -1$

210) Draw a network diagram for the project whose activities. and their predecessor relationships are given below:

Activity :	A	B	C	D	E	F
Predecessor activity :	–	–	D	A	B	C

211) Construct the network for the projects consisting of va.rious activities and their precedence relationships are as given as following table:

Immediate predecessor:	A	B	C	D	E	F	G	I	H
Activity :	B	C	D, E ,F	G	I	H	J	K	L

212) A furniture dealer deals only two items viz., tables and chairs. He has to invest Rs.10,000/- and a space to store atmost 60 pieces. A table cost him Rs.500/– and a chair Rs.200/–. He can sell all the items that he buys. He is getting a profit of Rs.50 per table and Rs.15 per chair. Formulate this problem as an LPP, so as to maximize the profit.

213) A firm manufactures pills in two sizes A and B. Size A contains 2 mgs of aspirin, 5 mgs of bicarbonate and 1 mg of codeine. Size B contains 1 mg. of aspirin, 8 mgs. of bicarbonate and 6 mgs. of codeine. It is found by users that it requires atleast 12 mgs. of aspirin, 74 mgs.of bicarbonate and 24 mgs. of codeine for providing immediate relief. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the problem as a standard LLP.

214) Construct a network diagram for the following situation:
A < D, E; B, D < F; C < G and B < H.

215) Solve the following LPP graphically. Minimize $Z = x_1 - 5x_2 + 20$
Subject to the constraints $x_1 - x_2 \geq 0, -x_1 + 2x_2 \geq 2, x_1 \geq 3, x_2 \leq 4$ and $x_1, x_2 \geq 0$.

216) Solve the following LPP graphically. Maximize $Z = 6x_1 + 5x_2$ Subject to the constraints $3x_1 + 5x_2 \leq 15$, $5x_1 + 2x_2 \leq 10$ and $x_1, x_2 \geq 0$

217) If the slope of one of the straight lines $ax^2 + 2hxy + by^2 = 0$ is thrice that of the other, then show that $3h^2 = 4ab$.

218) Find the values of a and b if the equation $(a-1)x^2 + by^2 + (b-8)xy + 4x + 4y - 1 = 0$ represents a circle.

219) Find the value of k so that the line $3x + 4y - k = 0$ is a tangent to $x^2 + y^2 - 64 = 0$

220) Find the focus, the vertex, the equation of the directrix, the axis and the length of the latus rectum of the parabola $y^2 = -12x$

221) Find the equation of the circle whose centre is (2,3) and which passes through (1 , 4)

222) If the equation $ax^2 + 5xy - 6y^2 + 12x + 5y + c = 0$ represents a pair of perpandicular straight lines, find a and c.

223) Find the vertex, focus, axis, directrix and the length of latus rectum of the parabola $y^2 - 8y - 8x + 24 = 0$

224) For what value of k does $2x^2 + 5xy + 2y^2 + 15x + 18y + k = 0$ represent a pair of straight lines.

225) The slope of one of the straight lines $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, show that $8h^2 = 9ab$.

226) Show that the pair of straight lines $4x^2 - 12xy + 9y^2 + 18x - 27y + 8 = 0$ represents a pair of parallel straight lines and find their separate equations.

227) If $A = \begin{bmatrix} 2 & 3 \\ 1 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 4 \\ 1 & -2 \end{bmatrix}$, then verify $\text{adj}(AB) = (\text{adj } B)(\text{adj } A)$

228) If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ show that $A^2 - 4A + 5I_2 = 0$ and also find A^{-1}.

229) If $A = \begin{vmatrix} -2 & 6 \\ 3 & -9 \end{vmatrix}$ then, find A^{-1}

230) Find adjoint of $A = \begin{bmatrix} 1 & -2 & -3 \\ 0 & 1 & 0 \\ -4 & 1 & 0 \end{bmatrix}$

231) Solve by using matrix inversion method:
$2x + 5y = 1$
$3x + 2y = 7$

232) If $(n + 2)C_n = 45$, find n

233) Find the middle terms in the expansion of $\left(3x + \frac{x^2}{2}\right)^8$

234) Find the term independent of x in the expansion of $\left(x^2 - \frac{2}{3x}\right)^9$

235) Find the term independent of x in the expansion of $\left(x - \frac{2}{x^2}\right)^{15}$

236) Evaluate the following using binomial theorem:$(999)^5$

237) Find the rank of the word 'RANK' in dictionary.

238) Using binomial theorem, expand $\left(x^2 + \frac{1}{x^2}\right)^4$

239) Find the Coefficient of x^{10} in the binomial expansion of $\left(2x^2 - \frac{3}{x}\right)^{11}$

240) How many triangles can be formed by joining the vertices of a hexagon?

241) If $\tan A = \frac{1}{7}$ and $\tan B = \frac{1}{3}$, show that $\cos 2A = \sin 4B$

242) If $\tan \alpha = \frac{1}{2}$ and $\tan \beta = \frac{1}{7}$ then prove that $(2\alpha + \beta) = \frac{\pi}{4}$.

243) Prove that $\cos^2 A + \cos^2(A + 120^\circ) + \cos^2(A - 120^\circ) = \frac{3}{2}$

244) Show that $\sin 20^\circ \sin 40^\circ \sin 80^\circ = \frac{\sqrt{3}}{8}$

245) Solve $\tan^{-1}(x + 2) + \tan^{-1}(2 - x) = \tan^{-1}(\frac{2}{3})$

246) Show that $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{2}{11}\right) = \tan^{-1}\left(\frac{3}{4}\right)$

247) Solve : $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$

248) What amount should be deposited annually so that after 16 years a person receives Rs 1,67,160 if the interest rate is 15% [$(1.15)^{16} = 9.358$]

249) A person deposits Rs 4,000 in the beginning of every year. If the rate of compound interest is 14% then, find the amount after 10 years. [$(1.14)^{10} = 3.707$]

250) Calculate the amount of an ordinary annuity of Rs 10,000 per annum for 5 years at 10% per year compounded half-yearly.

251) Find the amount of an ordinary annuity of Rs 600 is made at the end of every quarter for 10 years at the rate of 4% per year compounded quarterly.

252) The two regression lines were found to be 4X–5Y+33=0 and 20X–9Y–107=0. Find the mean values and coefficient of correlation between X and Y.

253) Find the means of X and Y variables and the coefficient of correlation between them from the following two regression equations:
2Y–X–50 = 0
3Y–2X–10 = 0

254) Calculate the correlation coefficient from the data given below:

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

255) The following information is given

Details	**X(in Rs.)**	**Y(in Rs.)**
Arithmetic Mean	6	8
Standard Deviation	5	$\frac{40}{3}$

Coefficient of correlation between X and Y is $\frac{8}{15}$. Find (i) The regression Coefficient of Y on X (ii) The most likely value of Y when X = Rs.100.

256) If $y = 2 + \log x$, then show that $xy_2 + y_1 = 0$.

257) If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$

258) Find the second order derivative of the following functions with respect to x, $x = at^2$, $y = 2at$

259) If the production of a firm is given by $p = 4LK - L^2 + K^2$, $L > 0$, $K > 0$, prove that $L\frac{\partial p}{\partial L} + k\frac{\partial p}{\partial k} = 2p$

260) Verify $\frac{\partial^2 u}{\partial x \partial y}$ $\frac{\partial^2 u}{\partial y \partial x}$ for $u = x^3 + 3x^2 y^2 + y^3$

261) If $f(x, y) = 3x^2 + 4y^3 + 6xy - x^3y^3 + 7$ then show that $f_{xy}(1,1) = 18$.

262) Letu = x cos y + y cos x. Verify $\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y \partial x}$

263) The production function for a commodity is P = 10L + 0.1 L^2 +15K- 0.2K^2 +2KL where L is labour and K is Capital.
(i) Calculate the marginal products of two inputs when 10 units of each of labour and Capital are used
(ii) If 10 units of capital are used, what is the upper limit for use of labour which a rational producer will never exceed?

64 x 5 = 320

264) Prove that $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$

265) The data are about an economy of two industries A and B. The values are in crores of rupees.

Producer	User		Final demand	Total output
	A	B		
A	50	75	75	200
B	100	50	50	200

Find the output when the final demand changes to 300 for A and 600 for B.

266) In an economy there are two industries P_1 and P_2 and the following table gives the supply and the demand position in crores of rupees.

Production sector	Consumption sector		Final demand	Gross output
	P_1	P_2		
P_1	10	25	15	50
P_2	20	30	10	60

Determine the outputs when the final demand changes to 35 for P_1 and 42 for P_2.

267) Find the equation of the circle passing through the points (0, 1) , (4 ,3) and (1, -1)

268) By the principle of mathematical induction, prove the following.
$1^3 + 2^3 + 3^3 + \ldots\ldots + n^3 = \frac{n^2(n+1)^2}{4}$ for all $n \in N$.

269) By the principle of mathematical induction, prove the following.
$1.2 + 2.3 + 3.4 + \ldots\ldots + n(n+1) = \frac{n(n+1)(n+2)}{3}$, for all $n \in N$.

270) By the principle of mathematical induction, prove the following.
$1 + 4 + 7 + \ldots\ldots + (3n - 2) = \frac{n(3n-1)}{2}$, for all $n \in N$.

271) If y = acos mx + b sin mx, then show that $y_2 + m^2 y = 0$.

272) If $y = \left(x + \sqrt{1 + x^2}\right)^m$, then show that $(1 + x)^2 y_2 + xy_1 - m^2 = 0$.

273) If y = sin (log x), then show that $x^2 y_2 + xy_1 + y = 0$.

274) Determine whether the points p(1,0), Q(2,1) and R(2,3) lie outside the circle, on the circle or inside the circle $x^2 + y^2 - 4x - 6y + 9 = 0$

275) Prove that $\frac{\cos 4x+\cos 3x+\cos 2x}{\sin 4x+\sin 3x+\sin 2x} = \cot 3x$

276) By the principle of mathematical induction, prove the following.
$3^{2n}-1$ is a divisible by 8, for all $n \in N$.

277) By the principle of mathematical induction, prove the following.
$a^n - b^n$ is divisible by a - b, for all $n \in N$.

278) By the principle of mathematical induction, prove the following.
$5^{2n} - 1$ is divisible by 24, for all $n \in N$.

279) Prove that: $\frac{\sin(180-\theta)\cos(90+\theta)\tan(270-\theta)\cot(360-\theta)}{\sin(360-\theta)\cot(360+\theta)\sin(270-\theta)\csc(-\theta)} = -1$

280) Prove that: $\sin\theta\cos\theta\left\{\sin\left(\frac{\pi}{2}-\theta\right)\csc\theta+\cos\left(\frac{\pi}{2}-\theta\right)\sec\theta\right\} = 1$

281) Prove that $\frac{\sin(180^o+A)\cos(90^o-A)\tan(270^o-A)}{\sec(540^o-A)\cos(360^o+A)\,cosec(270^o+A)} = -\sin A\cos^2 A$

282) Find whether the points (-1,-2), (1,0) and (-3, -4) lie above, below or on the line 3x + 2y + 7 = 0.

283) Prove that : $\cos20°\cos40°\cos80° = \frac{1}{8}$

284) Prove that : $(\cos\alpha-\cos\beta)^2+(\sin\alpha-\sin\beta)^2 = 4\sin^2\left(\frac{\alpha-\beta}{2}\right)$

285) Prove that $\cos 20° \cos 40° \cos 60° \cos 80^0 = \frac{1}{16}$

286) Show that MR = $p\left[1-\frac{1}{n_d}\right]$ for the demand function p = 400 - 2x - $3x^2$ where p is unit price and x is quantity demand

287) Find the absolute (global) maximum and absolute minimum of the function $f(x) = 3x^5 - 25x^3 + 60x + 1$ in the interval [–2,2]

288) Compute the earliest start time, earliest finish time, latest start time and latest finish time of each activity of the project given below:

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration(in days)	8	4	10	2	5	3

289) A project schedule has the following characteristics

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7

Construct the network and calculate the earliest start time, earliest finish time, latest start time and latest finish time of each activity and determine the Critical path of the project and duration to complete the project.

290) A Project has the following time schedule

Activity	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
Duration(in days)	7	6	14	5	11	7	11	4	18

Construct the network and calculate the earliest start time, earliest finish time, latest start time and latest finish time of each activity and determine the Critical path of the project and duration to complete the project.

291) Find the local minimum and local maximum of $y = 2x^3 - 3x^2 - 36x + 10$.

292) A company uses 48000 units/year of a raw material costing RS.2.5 per unit. Placing each order costs Rs. 45 and the carrying cost is 10.8 % per year of the average inventory. Find the EOQ, total number of orders per year and time between each order. Also verify that at EOQ carrying cost is equal to ordering cost.

293) Calculate the earliest start time, earliest finish time, latest start time and latest finish time of each activity of the project given below and determine the Critical path of the project and duration to complete the project.

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration (in week)	8	7	12	4	10	3	5	10	7	4

294) A manufacturer has to supply 12,000 units of a product per year to his customer. The ordering cost (C_3) is Rs. 100 per order and carrying cost is Rs 0.80 per item per month. Assuming there is no shortage cost and the replacement is instantaneous, determine the

(i) economic order quantity

(ii) time between orders

(iii) number of orders per year

295) A company buys in lots of 500 boxes which is a 3 month supply. The cost per box is Rs 125 and the ordering cost in Rs 150. The inventory carrying cost is estimated at 20% of unit value.

(i) Determine the total amount cost of existing inventory policy

(ii) How much money could be saved by applying the economic order quantity?

296) The following table gives the annual demand and unit price of 3 items

Items	**Annual Demand (units)**	**Unit Price Rs**
A	800	0.02
B	400	1.00
C	13,800	0.20

Ordering cost is Rs. 5 per order and holding cost is 10% of unit price. Determine the following:

(i) EOQ in units

(ii) Minimum average cost

(iii) EOQ in rupees

(iv) EOQ in years of supply

(v) Number of orders per year.

297) A dealer has to supply his customer with 400 units of a product per every week. The dealer gets the product from the manufacturer at a cost of Rs 50 per unit. The cost of ordering from the manufacturers in Rs 75 per order. The cost of holding inventory is 7.5 % per year of the product cost. Find (i) EOQ (ii) Total optimum cost.

298) Find out the coefficient of correlation in the following case and interpret.

Height of father (in inches)	65	66	67	67	68	69	71	73
Height of son (in inches)	67	68	64	68	72	70	69	70

299) Calculate correlation coefficient for the following data.

X	25	18	21	24	27	30	36	39	42	48
Y	26	35	48	28	20	36	25	40	43	39

300) An examination of 11 applicants for a accountant post was taken by a finance company. The marks obtained by the applicants in the reasoning and aptitude tests are given below.

Applicant	A	B	C	D	E	F	G	H	I	J	K
Reasoning test	20	50	28	25	70	90	76	45	30	19	26
Aptitude test	30	60	50	40	85	90	56	82	42	31	49

Calculate Spearman's rank correlation coefficient from the data given above.

301) The rank of 10 students of same batch in two subjects A and B are given below. Calculate the rank correlation coefficient.

Rank of A	1	2	3	4	5	6	7	8	9	10
Rank of B	6	7	5	10	3	9	4	1	8	2

302) Ten competitors in a beauty contest are ranked by three judges in the following order

First judge	1	4	6	3	2	9	7	8	10	5
Second judge	2	6	5	4	7	10	9	3	8	1
Third judge	3	7	4	5	10	8	9	2	6	1

Use the method of rank correlation coefficient to determine which pair of judges has the nearest approach to common taste in beauty?

303) Compute upper Quartiles, lower Quartiles, D_4 and P_{60}, P_{75} from the following data.

CI	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	19	5	10	9	6	6

304) Equal amounts are invested in 10% stock at 89 and 7% stock at 90 (1% brokerage paid in both transactions). If 10% stock bought Rs 100 more by way of dividend income than the other, find the amount invested in each stock.

305) A person sells a 20% stock of face value Rs 10,000 at a premium of 42%. With the money obtained he buys a 15% stock at a discount of 22%. What is the change in his income if the brokerage paid is 2%.

306) A man buys 400 of Rs 10 shares at a premium of Rs 2.50 on each share. If the rate of dividend is 12%, then find
(i) his investment
(ii) annual dividend received by him
(iii) rate of interest received by him on his money

307) A man invests Rs 13,500 partly in 6% of Rs 100 shares at Rs 140 and the remaining in 5% of Rs 100 shares at Rs 125. If his total income is Rs 560, how much has he invested in each?

308) Gopal invested Rs 8,000 in 7% of Rs 100 shares at Rs 80. After a year he sold these shares at Rs 75 each and invested the proceeds (including his dividend) in 18% for Rs 25 shares at Rs 41. Find
(i) his dividend for the first year
(ii) his annual income in the second year
(iii) The percentage increase in his return on his original investment

309) Compute Quartile deviation from the following data

CI	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	12	19	5	10	9	6	6

310) Find lower quartile, upper quartile, 7^{th} decile, 5^{th} decile and 60^{th} percentile for the following frequency distribution.

wages	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	1	3	11	21	43	32	9

311) The monthly incomes of 8 families in rupees in a certain locality are given below. Calculate the mean, the geometric mean and the harmonic mean and confirm that the relations among them holds true. Verify their relationships among averages.

Family:	A	B	C	D	E	F	G	H
Income (Rs.):	70	10	50	75	8	25	8	42

312) Find out the coefficient of mean deviation about median in the following series

Age in years	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of persons	8	12	16	20	37	25	19	13

313) The first of three urns contains 7 White and 10 Black balls, the second contains 5 White and 12 Black balls and third contains 17 White balls and no Black ball. A person chooses an urn at random and draws a ball from it. And

the ball is found to be White. Find the probabilities that the ball comes from
(i) the first urn
(ii) the second urn
(iii) the third urn

314) A company has three machines A, B, C which produces 20%, 30% and 50% of the product respectively. Their respective defective percentages are 7, 3 and 5. From these products one is chosen and inspected. If it is defective what is the probability that it has been made by machine C?

315) Find out the coefficient of mean deviation about median in the following series.

Age in years	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of persons	20	25	32	40	42	35	10	8

Calculations have to be made correct to two places of decimals.

316) In a shooting test the probability of hitting the target are $\frac{3}{4}$ for A, $\frac{1}{2}$ for B and $\frac{2}{3}$ for C. If all of them fire at the same target, calculate the probabilities that
(i) All the three hit the target
(ii) Only one of them hits the target
(iii) At least one of them hits the target

317) In a screw factory machines A, B, C manufacture respectively 30%, 40% and 30% of the total output of these 2%, 4% and 6% percent are defective screws. A screws is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by Machine C?

318) A, B and C was 50%, 30% and 20% of the cars in a service station respectively. They fail to clean the glass in 5% , 7% and 3% of the cars respectively. The glass of a washed car is checked. What is the probability that the glass has been cleaned?

319) Resolve into partial fraction : $\frac{x+4}{(x^2-4)(x+1)}$

320) By Mathematical Induction, prove that $1^2 + 2^2 + 3^2 + \ldots\ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$, for all $n \in N$.

321) Find the equation of the circle passing through the points (0,0), (1, 2) and (2,0).

322) If cosA = $\frac{4}{5}$ and cosB = $\frac{12}{13}$, $\frac{3\pi}{2} < (A, B) < 2\pi$, find the value of sin(A - B)

323) If cosA = $\frac{4}{5}$ and cosB = $\frac{12}{13}$, $\frac{3\pi}{3} < (A, B) < 2\pi$, , find the value of cos(A+B).

324) Prove that $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = 4\cos^2\left(\frac{\alpha-\beta}{2}\right)$

325) Find mean deviation about the median.

Class	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30
Frequency	8	10	12	9	5

326) Calculate mean deviation about mean

x	3	9	17	23	27
f	8	10	12	9	5

327) Find Quartile deviation

Wages	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
No. of labourers	3	5	20	10	5

328) Solve by matrix inversion method: 3x - y + 2z = 13 ; 2x + Y - z = 3 ; x + 3y - 5z = - 8.

329) You are given the following transaction matrix for a two sector economy.

Sector	**Sales**		**Final demand**	**Gross output**
	1	**2**		
1	4	3	13	20
2	5	4	3	12

i) Write the technology matrix.

ii) Determine the output when the final demand for the output sector 1 alone increases to 23 units.

330) Show that the matrices A = $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} \frac{4}{5} & -\frac{2}{5} & -\frac{1}{5} \\ -\frac{1}{5} & \frac{3}{5} & -\frac{1}{5} \\ -\frac{1}{5} & -\frac{2}{5} & \frac{4}{5} \end{bmatrix}$ are inverses of each other.

331) If A = $\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then, verify that $(AB)^{-1} = B^{-1}A^{-1}$

332) Evaluate: $\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix}$

333) If A = $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 4 & 7 \\ 1 & -1 & 1 \end{bmatrix}$ verify that A (adj A) = (adj A) A = $|A|\ I_3$.

334) Show by the principle of mathematical induction that $2^{3n}-1$ is a divisible by 7, for all $n \in N$.

335) Resolve into partial fractions for the following : $\frac{1}{(x^2+4)(x+1)}$

336) In how many ways can a cricket team of 11 players be chosen out of a batch of 15 players?
(i) There is no restriction on the selection.
(ii) A particular player is always chosen.
(iii) A particular player is never chosen.

337) Prove that the term independent of x in the expansion of $\left(x+\frac{1}{x}\right)^{2n}$ *is* $\frac{1.3.5.....,(2n-1)2^n}{n!}$

338) Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5....(2n-1)2^n.x^n}{n!}$

339) Find the equation of the circle on the line joining the points (1,0), (0,1) and having its centre on the line x + y= 1

340) Show that the equation $12x^2 - 10xy + 2y^2 + 14x - 5y + 2 = 0$ represents a pair of straight lines and also find the separate equations of the straight lines.

341) Show that the equation $2x^2 + 7xy + 3y^2 + 5x + 5y + 2 = 0$ represent two straight lines and find their separate equations.

342) Solve $tan^{-1}\left(\frac{x-1}{x-2}\right)+tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}$

343) Solve : $\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}\left(\frac{4}{7}\right)$

344) If $x\sqrt{1+y}+y\sqrt{1+x}=0$ and $x \neq y$, then prove that $\frac{dy}{dx}=\frac{-1}{(x+1)^2}$.

345) Differentiate the following with respect to x $\sqrt{\frac{(x-1)(x-2)}{(x-3)(x^2+x+1)}}$

346) If $x^m.y^n = (x+y)^{(m+n)}$,then show that $\frac{dy}{dx}=\frac{y}{x}$

347) For the demand function $p = 550 - 3x - 6x^2$ where x is quantity demand and p is unit price. Show that MR = $p\left[1-\frac{1}{n_d}\right]$

348) The demand for a commodity x is $q= 5-2p_1+P_2 -p_1^2p_2$ .Find the partial elasticities $\frac{Eq}{EP_1}$ and $\frac{Eq}{EP_2}$ when $p_1=3$ and $p_2=7$

349) The demand for a commodity A is $q = 80 - p_1^2 + 5p_2 - p_1p_2$. Find the partial elasticities $\frac{Eq}{Ep_1}$ and $\frac{Eq}{Ep_2}$ when $p_1=2$, $p_2 = 1$.

350) Let u = $\log\frac{x^4+y^4}{x+y}$. By using Euler's theorem show that $x.\frac{\partial u}{\partial x}+y.\frac{\partial u}{\partial y}=3$.

351) Solve the following linear programming problem graphically.
Maximise $Z = 4x_1 + x_2$ subject to the constraints $x_1 + x_2 \leq 50$; $3x_1 + x_2 \leq 90$ and $x_1 \geq 0$, $x_2 \geq 0$.

352) Solve the following linear programming problem graphically.
Minimize $Z=200x_1+500x_2$ subject to the constraints $x_1+2x_2\geq10$; $3x_1+4x_2\leq24$ and $x_1\geq0$, $x_2\geq0$

353) The following table gives the activities of a project and their duration in days

Activity	1-2	1-3	2-3	2-4	3-4	3-5	4-5
Duration	5	8	6	7	5	4	8

Construct the network and calculate the earliest start time, earliest finish time, latest start time and latest finish time of each activity and determine the Critical path of the project and duration to complete the project.

354) For the given lines of regression 3X–2Y=5 and X–4Y=7. Find

(i) Regression coefficients

(ii) Coefficient of correlation

355) From the data given below

Marks in Economics:	25	28	35	32	31	36	29	38	34	32
Marks in Statistics:	43	46	49	41	36	32	31	30	33	39

Find (a) The two regression equations, (b) The coefficient of correlation between marks in Economics and statistics, (c) The mostly likely marks in Statistics when the marks in Economics is 30.

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