MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

TANGENTS AND NORMALS

Solved Examples And Exercises

1. Show that the curves $\frac{x^2}{a^2+\lambda_1}+\frac{y^2}{b^2+\lambda_1}=1$ and

$\frac{x^2}{a^2+\lambda_2}+\frac{y^2}{b^2+\lambda_2}=1$ intersect at right angles.

Watch Video Solution

2. Find the condition for the following set of curves to intersect orthogonally: $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $xy=c^2$ $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and $\frac{x^2}{A^2}-\frac{y^2}{B^2}=1$.

Watch Video Solution

3. Show that the following set of curves intersect orthogonally: (i)

$y = x^3$ and $6y = 7 - x^2$, (ii)

$x^3 - 3xy^2 = -2$ and $3x^2y - y^3 = 2$. (iii)

$x^2 + 4y^2 = 8$ and $x^2 - 2y^2 = 4$

Watch Video Solution

4. Find the angle of intersection of the following curves :

$(i) y^2 = x and x^2 = y$

$(ii) y = x^2 and x^2 + y^2 = 20$

$(iii) 2y^2 = x^3 and y^2 = 32x$

Watch Video Solution

5. Show that the curves $4x = y^2$ and $4xy = k$ cut at right angles, if $k^2 = 512$.

Watch Video Solution

6. Find the equation of the tangent to the curve $\sqrt{x} + \sqrt{y} = a,$ at the point

$\left(\frac{a^2}{4}, \frac{a^2}{4}\right)$.

Watch Video Solution

7. Find a point on the curve $y = x^3 - 3x$ where the tangent is parallel to the chord joining $(1, -2) and (2, 2)$.

Watch Video Solution

8. Find the points on the curve $xy + 4 = 0$ at which the tangents are inclined at an angle of

45^0 with the x − a xi s .

Watch Video Solution

9. Find the equation of normal line to the curve $y = x^3 + 2x + 6$ which is parallel to the line $x + 14y + 4 = 0$.

Watch Video Solution

10. Find the slopes of the tangent and the normal to the following curves at the

indicated points: $y = \sqrt{x^3} atx = 4$

$y = \sqrt{x^3} atx = 9$ $y = x^3 - xatx = 2$

$y = 2x^2 + 3\sin xatx = 0$

$x = a(\theta - \sin\theta), y = a(1 + \cos\theta) ah\eta = -\frac{\pi}{2}$

$x = a\cos^3\theta, y = a\sin^3\theta ah\eta = \frac{\pi}{4}$

$x = a\left(\theta - s\int h\eta\right), y = a(1 - \cos\theta) ah\eta = \frac{\pi}{2}$

$y = (\sin 2x + \cot x + 2)^2 atx = \frac{\pi}{2}$

$x^2 + 3y + y^2 = 5at(1, 1)\ xy = 6at(1, 6)$

Watch Video Solution

11. If the tangent to the curve $y = x^3 + ax + b$ at (1,-6) is parallel to the line $x - y + 5 = 0,$ find a and b

Watch Video Solution

12. Find the equation of the tangent to the curve $x = \sin 3t, y = \cos 2t$ at $t = \frac{\pi}{4}.$

Watch Video Solution

13. Prove that $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$ touches the straight line $\frac{x}{a} + \frac{y}{b} = 2$ for all $\in N$, at the point (a, b).

Watch Video Solution

14. At what point on the circle $x^2 + y^2 - 2x - 4y + 1 = 0$, the tangent is parallel to x-axis.

Watch Video Solution

15. Find the point on the curve $y = x^2$ where the slope of the tangent is equal to the $x -$ coordinate of the point.

Watch Video Solution

16. At what point will be tangents to the curve $y = 2x^3 - 15x^2 + 36x - 21$ by parallel to x=axis? Also, find the equations of the tangents to the curve at these points.

Watch Video Solution

17. If the straight line $x\cos\alpha + y\sin\alpha = p$ touches the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then prove that $a^2\cos^2\alpha - b^2\sin^2\alpha = p^2$.

Watch Video Solution

18. Find the point on the curve $y = 3x^2 + 4$ at which the tangent is perpendicular to the line whose slope is $-\frac{1}{6}$.

Watch Video Solution

19. Find the equation of the normal to $y = 2x^3 - x^2 + 3$ at (1,4).

Watch Video Solution

20. Find the point on the curve $y = 3x^2 - 9x + 8$ at which the tangents are equally inclined with the axes.

Watch Video Solution

21. Find the equation of the tangent to the curve $x = \theta + \sin\theta, y = 1 + \cos\theta$, at $\theta = \frac{\pi}{4}$

Watch Video Solution

22. Find the equation of the normal to the curve $x^2 + 2y^2 - 4x - 6y + 8 = 0$ at the point whose abscissa is 2.

Watch Video Solution

23. The equation of the tangent at (2,3) on the curve $y^2 = ax^3 + b$ is $y = 4x - 5$. Find the values of a and b

Watch Video Solution

24. Find the equation of the tangent line to the curve $y = x^2 + 4x - 16$ which is parallel to the line $3x - y + 1 = 0$.

Watch Video Solution

25. If the straight line $x\cos\alpha + y\sin\alpha = p$ touches the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then prove that $a^2\cos^2\alpha + b^2\sin^2\alpha = p^2$.

Watch Video Solution

26. Find the angle of intersection of the following curves: $xy = 6$ and $x^2y = 12$

$y^2 = 4x$ and$x^2 = 4y$

Watch Video Solution

27. Show that the curves $x = y^2 and xy = k$ cut at right angles, if $8k^2 = 1$

Watch Video Solution

28. The curve $y = ax^3 + bx^2 + cx + 5$ touches the x-axis at $P(-2, 0)$ and cuts the y-axis at the point Q where its gradient is 3. Find the equation of the curve completely.

Watch Video Solution

29. Determine the quadratic curve $y = f(x)$ if it touches the line $y = x$ at the point $x = 1$ and passes through the point $(-1, 0)$.

Watch Video Solution

30. Find all the tangents to the curve $y = \cos(x + y), -2\pi \leq x \leq 2\pi$ that are parallel to the line $x + 2y = 0$.

Watch Video Solution

31. Find the equation of the normal to the curve $y = (1+x)^y + \sin^{-1}(\sin^2 x)$ at $x = 0$.

Watch Video Solution

32. Find the equation of the tangent to the curve $y = (x^3 - 1)(x - 2)$ at the points where the curve cuts the x-axis.

Watch Video Solution

33. Show that the line $\frac{x}{a}+\frac{y}{b}=1$ touches the curve $y=be^{-\frac{x}{a}}$ at the point where it crosses the y-axis.

Watch Video Solution

34. Find the equations of tangent and normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at (x_1, y_1)

Watch Video Solution

35. Find the equation of the normal to the curve $y = 2x^2 + 3\sin x$ at $x = 0$.

Watch Video Solution

36. Find the coordinates of the points on the curve $y = x^2 + 3x + 4$, the tangents at which pass through the origin.

Watch Video Solution

37. Find the equations of the tangents drawn to the curve $y^2 - 2x^2 - 4y + 8 = 0.$ from point $(1, 2)$

Watch Video Solution

38. Find the equation(s) of normal(s) to the curve $3x^2 - y^2 = 8$ which is (are) parallel to the line $x + 3y = 4.$

Watch Video Solution

39. Find the equation of the tangent line to the curve $y = \sqrt{5x - 3} - 2$ which is parallel to the line $4x - 2y + 3 = 0$

Watch Video Solution

40. Find the points on the curve $4x^2 + 9y^2 = 1$, where the tangents are perpendicular to the line $2y + x = 0$.

Watch Video Solution

41. Find the points on the curve $9y^2 = x^3$ where normal to the curve makes equal intercepts with the axes.

Watch Video Solution

42. Prove that the curves $xy = 4$ and $x^2 + y^2 = 8$ touch each other.

Watch Video Solution

43. Prove that the curves $y^2 = 4x$ and $x^2 + y^2 - 6x + 1 = 0$ touch each other at the points $(1,\ 2)$.

Watch Video Solution

44. Show that the angle between the tangent at any point P and the line joining P to the origin O is same at all points on the curve $\log(x^2 + y^2) = k \tan^{-1}\left(\frac{y}{x}\right)$

Watch Video Solution

45. Find the slopes of the tangent and the normal to the curve $x^2 + 3yy2 = 5$ at $(1, 1)$

Watch Video Solution

46. Show that the tangents to the curve $y = x^3 - 3$ at the points where $x = 2$and $x = -2$ are parallel.

Watch Video Solution

47. Prove that the tangents to the curve $y = x^2 - 5 + 6$ at the points $(2, 0) and (3, 0)$ are at right angles.

Watch Video Solution

48. The slope of the curve $2y^2 = ax^2 + bat(1, -1)$ is -1 Find a, b

Watch Video Solution

49. Find the points on the curve $y = x^3 - 2x^2 - x$ at which the tangent lines are parallel to the line $y = 3x - 2$

Watch Video Solution

50. At what points on the curve $x^2 + y^2 - 2x - 4y + 1 = 0$, the tangents are parallel to the $y - a$ is?

Watch Video Solution

51. Find the required point be $P(x_1, y_1)$. The tangent to the curve $\sqrt{x} + \sqrt{y} = 4$ at which tangent is equally inclined to the axes.

Watch Video Solution

52. Show that the curves $2x = y^2 and 2xy = k$ cut at right angles, if $k^2 = 8$.

Watch Video Solution

53. Show that the curves $xy = a^2 and x^2 + y^2 = 2a^2$ touch each other

Watch Video Solution

54. Find the slopes of the tangent and the normal to the curve $x^2 + 3y + y^2 = 5$ at $(1,\ 1)$

Watch Video Solution

55. Show that the tangents to the curve $y = 2x^3 - 3$ at the points where $x = 2$ and $x = -2$ are parallel.

Watch Video Solution

56. Prove that the tangents to the curve $y = x^2 - 5x + 6$ at the points (2, 0) and (3, 0) are at right angles.

Watch Video Solution

57. The slope of the curve $2y^2 = ax^2 + b$ at $(1, -1)$ is -1. Find a, b.

Watch Video Solution

58. Find the slope of the normal to the curve $x = 1 - a\sin\theta, y = b\cos^2\theta$ at $\theta = \frac{\pi}{2}$.

Watch Video Solution

59. Find the slope of the normal to the curve $x = a\cos^3\theta, y = a\, s\in^3\theta$ at $\theta = \frac{\pi}{4}$.

Watch Video Solution

60. Find the points on the curve $y = x^3 - 2x^2 - x$ at which the tangent lines are parallel to the line $y = 3x - 2$.

Watch Video Solution

61. Find the point on the curve $y = 2x^2 - 6x - 4$ at which the tangent is parallel to the x-axis.

Watch Video Solution

62. At what points on the curve $x^2 + y^2 - 2x - 4y + 1 = 0$, the tangents are parallel to the $y - a$ is?

Watch Video Solution

63. For which value of m is the line y = mx + 1 a tangent to the curve $y^2 = 4x$

A. 1/2

B. 1

C. 2

D. 3

Answer: Option 2

Watch Video Solution

64. Find points on the curve $\frac{x^2}{9} + \frac{y^2}{16} = 1$ at which the tangents are parallel to the y-axis.

A. (0,4) & (0,-4)

B. (4,0) & (-4,0)

C. (3,0) & (-3,0)

D. (0,3) & (0,-3)

Answer: Option C

Points are $(3, 0)$ **and** $(-3, 0)$**.**

Watch Video Solution

65. Find a point on the curve $y = (x - 3)^2$, where the tangent is parallel to the line joining $(4,\ 1)$ and $(3,\ 0)$.

Watch Video Solution

66. Find the required point be $P(x_1, y_1)$. The tangent to the curve $\sqrt{x} + \sqrt{y} = 4$ at which tangent is equally inclined to the axes.

Watch Video Solution

67. Find the points on the curve $4x^2 + 9y^2 = 1$, where the tangents are perpendicular to the line $2y + x = 0$

Watch Video Solution

68. Find the point on the curve $y = x^3 - 11x + 5$ at which the tangent has the equation $y = x - 11$

Watch Video Solution

69. Find the points on the curve $9y^2 = x^3$ where normal to the curve makes equal intercepts with the axes.

Watch Video Solution

70. Find the slopes of the tangent and the normal to the curve $y = \sqrt{x^3}$ at $x = 4$

Watch Video Solution

71. Find the slopes of the tangent and the normal to the curve $y = \sqrt{x}$ at $x = 9$

Watch Video Solution

72. Find the slopes of the tangent and the normal to the curve $y = x^3 - x$ at $x = 2$

Watch Video Solution

73. Find the slopes of the tangent and the normal to the curve $y = 2x^2 + 3\sin x$ at $x = 0$

Watch Video Solution

74. Find the slopes of the tangent and the normal to the curve $x = a(\theta - \sin\theta)$, $y = a(1 + \cos\theta)$ at $\theta = -\pi/2$

Watch Video Solution

75. Find the slopes of the tangent and the normal to the curve $x = a\cos^3\theta, y = a\sin^3\theta$ at $\theta = \pi/4$

Watch Video Solution

76. Find the slopes of the tangent and the normal to the curve $x = a(\theta - \sin\theta),\ \ y = a(1 - \cos\theta)$ at $\theta = \pi/2$

Watch Video Solution

77. Find the slopes of the tangent and the normal to the curve $y = (\sin 2x + \cot x + 2)^2$ at $x = \pi/2$

Watch Video Solution

78. Find the slopes of the tangent and the normal to the curve $x^2 + 3y + y^2 = 5$ at (1, 1)

Watch Video Solution

79. Find the slopes of the tangent and the normal to the curve $xy = 6$ at $(1,\ 6)$

Watch Video Solution

80. Find the values of a and b if the slope of the tangent to the curve $xy + ax + by = 2$ at $(1,\ 1)$ is 2.

Watch Video Solution

81. If the tangent to the curve $y = x^3 + ax + b$ at $(1, \ -6)$ is parallel to the line $x - y + 5 = 0$, find a and b.

Watch Video Solution

82. Find a point on the curve $y = x^3 - 3x$ where the tangent is parallel to the chord joining $(1, \ -2)$ and $(2, \ 2)$.

Watch Video Solution

83. Find the points on the curve $x^3 - 2x^2 - 2x$ at which the tangent lines are parallel to the line $y = 2x - 3$.

Watch Video Solution

84. Find the points on the curve $y^2 = 2x^3$ at which the slope of the tangent is 3.

Watch Video Solution

85. Find the points on the curve $xy + 4 = 0$ at which the tangents are inclined at an angle of $45o$ with the x-axis.

Watch Video Solution

86. Find the point on the curve $y = x^2$ where the slope of the tangent is equal to the x-coordinate of the point.

Watch Video Solution

87. At what points on the circle $x^2 + y^2 - 2x - 4y + 1 = 0$, the tangent is parallel to the x-axis.

Watch Video Solution

88. At what point of the curve $y = x^2$ does the tangent make an angle of $45o$ with the x-axis?

Watch Video Solution

89. Find the points on the curve $y = 3x^2 - 9x + 8$ at which the tangents are equally inclined with the axes.

Watch Video Solution

90. At what points on the curve $y = 2x^2 - x + 1$ is the tangent parallel to the line $y = 3x + 4$?

Watch Video Solution

91. Find the point on the curve $y = 3x^2 + 4$ at which the tangent is perpendicular to the line whose slope is $-\frac{1}{6}$.

Watch Video Solution

92. Find the points on the curve $x^2 + y^2 = 13$, the tangent at each one of which is parallel to the line $2x + 3y = 7$.

Watch Video Solution

93. Find the points on the curve $2a^2y = x^3 - 3ax^2$ where the tangent is parallel to x-axis.

Watch Video Solution

94. At what points on the curve $y = x^2 - 4x + 5$ is the tangent perpendicular to the line $2y + x = 7$?

Watch Video Solution

95. Find the points on the curve $\frac{x^2}{4} + \frac{y^2}{25} = 1$ at which the tangents are parallel to the x-axis and y-axis.

Watch Video Solution

96. Find the points on the curve $x^2 + y^2 - 2x - 3 = 0$ at which the tangents are parallel to the x-axis and y-axis.

Watch Video Solution

97. Find the points on the curve $\frac{x^2}{9} + \frac{y^2}{16} = 1$ at which the tangents are parallel to the x-axis and y-axis.

Watch Video Solution

98. Show that the tangents to the curve $y = 7x^3 + 11$ at the points $x = 2$ and $x = -2$ are parallel.

Watch Video Solution

99. Find the points on the curve $y = x^3$ where the slope of the tangent is equal to x-coordinate of the point.

Watch Video Solution

100. Find the equation of the tangent to the curve $y = -5x^2 + 6x + 7$ at the point $(1/2,\ 35/4)$.

Watch Video Solution

101. Find the equation of the tangent and normal to the parabola $y^2 = 4ax$ at the point $(at^2,\ 2at)$.

Watch Video Solution

102. Find the equation of the normal to the curve $y = 2x^2 + 3\sin xatx = 0.$

Watch Video Solution

103. Find the equations of the tangent and the normal to $16x^2 + 9y^2 = 144$ at (x_1, y_1) where $x_1 = 2$ and $y_1 > 0$.

Watch Video Solution

104. Find the equations of tangent and normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at (x_1, y_1)

Watch Video Solution

105. Find the equation of the tangent line to the curve $x = 1 - \cos\theta,\ y = \theta - \sin\theta$ at $\theta = \pi/4$.

Watch Video Solution

106. Find the equations of the tangent and the normal at the point $'t'$ on the curve $x = a\ s \in^3 t, y = b\cos^3 t$.

Watch Video Solution

107. Show that the line $\frac{x}{a} + \frac{y}{b} = 1$ touches the curve $y = be^{-\frac{x}{a}}$ at the point where it crosses the y-axis.

Watch Video Solution

108. Find the equation of the tangent to the curve $y = \frac{x - 7}{(x - 2(x - 3)}$ at the point where it cuts the x-axis.

Watch Video Solution

109. Find the equation of the tangent to the curve $y = (x^3 - 1)(x - 2)$ at the points where the curve cuts the x-axis.

Watch Video Solution

110. Find the equation of the tangent line to the curve $y = \sqrt{5x - 3} - 2$ which is parallel to the line $4x - 2y + 3 = 0$.

Watch Video Solution

111. Find the equation of tangent line to $y = 2x^2 + 7$ which is parallel to the line $4x - y + 3 = 0$.

Watch Video Solution

112. Find the equation(s) of normal(s) to the curve $3x^2 - y^2 = 8$ which is (are) parallel to the line $x + 3y = 4$.

Watch Video Solution

113. Find the equation of normal line to the curve $y = x^3 + 2x + 6$ which is parallel to the line $x + 14y + 4 = 0$.

Watch Video Solution

114. Find the equations of the tangents drawn to the curve $y^2 - 2x^3 - 4y + 8 = 0$.

Watch Video Solution

115. Find the equation of the normal to the curve $x^2 = 4y$which passes through the point (1, 2).

Watch Video Solution

116. Find the coordinates of the points on the curve $y = x^2 + 3x + 4$, the tangents at which pass through the origin.

Watch Video Solution

117. For the curve $y = 4x^3 - 2x^5$ find all points at which the tangent passes through the origin.

Watch Video Solution

118. Find the equation of all lines having slope 1that are tangents to the curve $y = \frac{1}{x-1}, x \neq 1.$

Watch Video Solution

119. Prove that all normals to the curve

$$x = a\cos t + at\sin t, \quad y = a\sin t - at\cos t$$

are at a distance a from the origin.

Watch Video Solution

120. Find the equation of the normal to the curve $y = (1+x)^y + \sin^{-1}\left(\sin^2 x\right)atx = 0.$

Watch Video Solution

121. Find all the tangents to the curve $y = \cos(x + y), \ -2\pi \leq x \leq 2\pi$ that are parallel to the line $x + 2y = 0$. xyz

Watch Video Solution

122. The curve $y = ax^3 + bx^2 + cx + 5$ touches the x-axis at $P(-2, \ 0)$ and cuts the y-axis at the point Q where its gradient is 3. Find the equation of the curve completely.

Watch Video Solution

123. Determine the quadratic curve $y = f(x)$ if it touches the line $y = x$ at the point $x = 1$ and passes through the point $(-1, 0)$.

Watch Video Solution

124. Find the equation of the tangent to the curve $\sqrt{x} + \sqrt{y} = a$, at the point $(a^2/4, a^2/4)$.

Watch Video Solution

125. Find the equation of the normal to $y = 2x^3 - x^2 + 3$ at $(1,\ 4)$.

Watch Video Solution

126. Find the equations of the tangent and the normal to the curve $y = x^4 - bx^3 + 13x^2 - 10x + 5$ at $(0,\ 5)$ at the indicated points

Watch Video Solution

127. Find the equations of the tangent and the normal to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at $x = 1$ at the indicated points

Watch Video Solution

128. Find the equations of the tangent and the normal to the curve $y = x^2$ at $(0, 0)$ at the indicated points

Watch Video Solution

129. Find the equations of the tangent and the normal to the curve $y = 2x^2 - 3x - 1$ at $(1, -2)$ at the indicated points

Watch Video Solution

130. Find the equations of the tangent and the normal to the curve $y^2 = \frac{x^3}{4 - x}$ at $(2, -2)$ at the indicated points

Watch Video Solution

131. Find the equations of the tangent and the normal to the curve $y = x^2 + 4x + 1$ at $x = 3$ at the indicated points

Watch Video Solution

132. Find the equations of the tangent and the normal to the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at $(a\cos\theta,\ b\sin\theta)$ at the indicated points

Watch Video Solution

133. Find the equations of the tangent and the normal to the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $(a \sec\theta,\ b\tan\theta)$ at the indicated points.

Watch Video Solution

134. Find the equations of the tangent and the normal to the curve $y^2 = 4a\,x$ at $\left(a/m^2,\ 2a/m\right)$ at the indicated points

Watch Video Solution

135. Find the equations of the tangent and the normal to the curve $c^2(x^2 + y^2) = x^2 y^2$ at $\left(\frac{c}{\cos\theta}, \frac{c}{\sin\theta}\right)$ at the indicated points

Watch Video Solution

136. Find the equations of the tangent and the normal to the curve $xy = c^2$ at $(ct,\ c/t)$ at the indicated points.

Watch Video Solution

137. Find the equations of the tangent and the normal to the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at $(x_1,\ y_1)$ at the indicated points.

Watch Video Solution

138. Find the equation of the normal to the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at (x_0, y_0)

Watch Video Solution

139. Find the equations of the tangent and the normal to the curve $x^{2/3} + y^{2/3} = 2$ at $(1,\ 1)$ at indicated points.

Watch Video Solution

140. Find the equations of the tangent and the normal to the curve $x^2 = 4y$ at $(2,\ 1)$ at indicated points.

Watch Video Solution

141. Find the equations of the tangent and the normal to the curve $y^2 = 4x$ at $(1, 2)$ at indicated points.

Watch Video Solution

142. Find the equations of the tangent and the normal to the curve $4x^2 + 9y^2 = 36$ at $(3\cos\theta, 2\sin\theta)$ at indicated points.

Watch Video Solution

143. Find the equations of the tangent and the normal to the curve $y^2 = 4ax$ at (x_1, y_1) at indicated points.

Watch Video Solution

144. Find the equations of the tangent and the normal to the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $\left(\sqrt{2}a, b\right)$ at indicated points.

Watch Video Solution

145. Find the equation of the tangent to the curve $x = \theta + \sin\theta \quad , \quad y = 1 + \cos\theta$ at $\theta = \pi/4$.

Watch Video Solution

146. Find the equations of the tangent and the normal to the curve $x = \theta + \sin\theta$, $y = 1 + \cos\theta$ at $\theta = \pi/2$ at indicated points.

Watch Video Solution

147. Find the equation of tangent and normal to the curve $x = \frac{2at^2}{(1+t^2)}, y = \frac{2at^3}{(1+t^2)}$ at the point for which $t = \frac{1}{2}$.

Watch Video Solution

148. Find the equations of the tangent and the normal to the curve $x = at^2,\ y = 2at$ at $t = 1$.

Watch Video Solution

149. Find the equations of the tangent and the normal to the curve $x = a\sec t,\ \ y = b\tan t$ at t at indicated points.

Watch Video Solution

150. Find the equations of the tangent and the normal to the curve $x = a(\theta + \sin\theta),\ \ y = a(1 - \cos\theta)$ at θ at indicated points.

Watch Video Solution

151. Find the equations of the tangent and the normal to the curve $x = 3\cos\theta - \cos^3\theta,\ \ y = 3\sin\theta - s\in^3\theta$

Watch Video Solution

152. Find the equation of the normal to the curve $x^2 + 2y^2 - 4x - 6y + 8 = 0$ at the point whose abscissa is 2.

Watch Video Solution

153. Find the equation of the normal to the curve $ay^2 = x^3$ at the point $\left(am^2,\ am^3\right)$.

Watch Video Solution

154. The equation of the tangent at $(2,\ 3)$ on the curve $y^2 = ax^3 + b$ is $y = 4x - 5$. Find the values of a and b .

Watch Video Solution

155. Find the equation of the tangent line to the curve $y = x^2 + 4x - 16$ which is parallel to the line $3x - y + 1 = 0$.

Watch Video Solution

156. Find the equation of normal line to the curve $y = x^3 + 2x + 6$ which is parallel to the line $x + 14y + 4 = 0$.

Watch Video Solution

157. Determine the equation(s) of tangent(s) line to the curve $y = 4x^3 - 3x + 5$ which are perpendicular to the line $9y + x + 3 = 0$

Watch Video Solution

158. Find the equation of a normal to the curve $y = x(\log)_e x$ which is parallel to the line $2x - 2y + 3 = 0$.

Watch Video Solution

159. Find the equation of the tangent line to the curve $y = x^2 - 2x + 7$ which is parallel to the line $2x - y + 9 = 0$

Watch Video Solution

160. Find the equation of the tangent line to the curve $y = x^2 - 2x + 7$ which is perpendicular to the line $5y - 15x = 13$.

Watch Video Solution

161. Find the equations of all lines having slope 2 and that are tangent to the curve $y = \dfrac{1}{x-3}, \quad x \neq 3$.

Watch Video Solution

162. Find the equations of all lines of slope zero and that are tangent to the curve $y = \dfrac{1}{x^2 - 2x + 3}$.

Watch Video Solution

163. Find the equation of the tangent to the curve $y = \sqrt{3x - 2}$ which is parallel to the line $4x - 2y + 5 = 0$

Watch Video Solution

164. Find the equation of the tangent to the curve $x^2 + 3y - 3 = 0$, which is parallel to the line $y = 4x - 5$.

Watch Video Solution

165. Find the value of $n \in N$ such that the curve $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$ touches the straight line $\frac{x}{a} + \frac{y}{b} = 2$ at the point (a, b).

Watch Video Solution

166. Find the equation of the tangent to the curve $x = \sin 3t$, $y = \cos 2t$ at $t = \frac{\pi}{4}$.

Watch Video Solution

167. At what points will be tangents to the curve $y = 2x^3 - 15x^2 + 36x - 21$ be parallel to x-axis? Also, find the equations of the tangents to the curve at these points.

Watch Video Solution

168. Find the equation of the tangents to the curve $3x^2 - y^2 = 8$, which passes through the point $\left(\frac{4}{3}, 0\right)$.

Watch Video Solution

169. Find the angle of intersection of $xy = 6$ and $x^2y = 12$

Watch Video Solution

170. Find the angle of intersection of $y^2 = 4x$ and $x^2 = 4y$

Watch Video Solution

171. Find the angle between the parabolas $y^2 = 4ax$ and $x^2 = 4by$ at their point of intersection other than the origin.

Watch Video Solution

172. Show that the curves $x = y^2$ and $xy = k$ cut at right angles, if $8k^2 = 1$.

Watch Video Solution

173. Find the value of p for which curves $x^2 = 9p(9 - y)$ and $x^2 = p(y + 1)$ cut each other at right angles.

Watch Video Solution

174. Show that the curves $xy = a^2$ and $x^2 + y^2 = 2a^2$ touch each other.

Watch Video Solution

175. Show the condition that the curves $ax^2 + by^2 = 1$ and $a'\,x^2 + b'\,y^2 = 1$ Should intersect orthogonally

Watch Video Solution

176. If the straight line $x\cos\alpha + y\sin\alpha = p$ touches the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then prove that $a^2\cos^2\alpha + b^2\sin^2\alpha = p^2$.

Watch Video Solution

177. Show that the angle between the tangent at any point P and the line joining P to the origin O is the same at all points on the curve $\log(x^2 + y^2) = k \tan^{-1}\left(\frac{y}{x}\right)$.

Watch Video Solution

178. Find the angle of intersection of the curves $y^2 = x$ and $x^2 = y$

Watch Video Solution

179. Find the angle of intersection of curve $y = x^2$ and $x^2 + y^2 = 20$

Watch Video Solution

180. Find the angle of intersection of curve $2y^2 = x^3$ and $y^2 = 32x$

Watch Video Solution

181. Find the angle of intersection of curve $x^2 + y^2 - 4x - 1 = 0$ and

$x^2 + y^2 - 2y - 9 = 0$

Watch Video Solution

182. Find the angle of intersection of curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $x^2 + y^2 = ab$

Watch Video Solution

183. Find the angle of intersection of curve $x^2 + 4y^2 = 8$ and $x^2 - 2y^2 = 2$

Watch Video Solution

184. Find the angle of intersection of curve $x^2 = 27y$ and $y^2 = 8x$

Watch Video Solution

185. Find the angle of intersection of curve $x^2 + y^2 = 2x$ and $y^2 = x$

Watch Video Solution

186. Find the angle of intersection of curve $y = 4 - x^2$ and $y = x^2$

Watch Video Solution

187. Show that $y = x^3$ and $6y = 7 - x^2$ intersect orthogonally:

Watch Video Solution

188. Show that $x^3 - 3xy^2 = -2$ and $3x^2 y - y^3 = 2$ intersect orthogonally:

Watch Video Solution

189. Show that $x^2 + 4y^2 = 8$ and $x^2 - 2y^2 = 4$ intersect orthogonally

Watch Video Solution

190. Show that $x^2 = 4y$ and $4y + x^2 = 8$ intersect orthogonally at $(2,\ 1)$

Watch Video Solution

191. Show that $x^2 = y$ and $x^3 + 6y = 7$ intersect orthogonally at $(1,\ 1)$

Watch Video Solution

192. Show that $y^2 = 8x$ and $2x^2 + y^2 = 10$ at $\left(1,\ 2\sqrt{2}\right)$

Watch Video Solution

193. Show that the curves $4x = y^2$ and $4xy = k$ cut at right angles, if $k^2 = 512$.

Watch Video Solution

194. Show that the curves $2x = y^2$ and $2xy = k$ cut at right angles, if $k^2 = 8$.

Watch Video Solution

195. Prove that the curves $xy = 4$ and $x^2 + y^2 = 8$ touch each other.

Watch Video Solution

196. Prove that the curves $y^2 = 4x$ and $x^2 + y^2 - 6x + 1 = 0$ touch each other at the points $(1,\ 2)$.

Watch Video Solution

197. Find the condition for the following set of curves to intersect orthogonally: $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $xy = c^2$ $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $\frac{x^2}{A^2} - \frac{y^2}{B^2} = 1$.

Watch Video Solution

198. Find the condition for the two concentric ellipses

$a_1x^2 + b_1y^2 = 1 \, and \, a_2x^2 + b_2y^2 = 1$ to intersect orthogonally.

Watch Video Solution

199. If the straight line $x\cos\alpha + y\sin\alpha = p$ touches the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then prove that $a^2\cos^2\alpha + b^2\sin^2\alpha = p^2$.

Watch Video Solution

200. Find the point on the curve $y = x^2 - 2x + 3$, where the tangent is parallel to x-axis.

Watch Video Solution

201. Find the slope of the tangent to the curve $x = t^2 + 3t - 8, y = 2t^2 - 2t - 5$ at $t = 2$.

Watch Video Solution

202. If the tangent line at a point (x, y) on the curve $y = f(x)$ is parallel to x-axis, then write the value of $\frac{dy}{dx}$.

Watch Video Solution

203. Write the value of $\frac{dy}{dx}$, if the normal to the curve $y = f(x)$ at (x, y) is parallel to y-axis.

Watch Video Solution

204. If the tangent to a curve at a point $(x,\ y)$ is equally inclined to the coordinate axes, then write the value of $\frac{dy}{dx}$.

Watch Video Solution

205. If the tangent line at a point $(x,\ y)$ on the curve $y = f(x)$ is parallel to y-axis, find the value of $\frac{dx}{dy}$.

Watch Video Solution

206. Find the slope of the normal at the point $'t'$ on the curve $x = \frac{1}{t}, \quad y = t$.

Watch Video Solution

207. Write the coordinates of the point on the curve $y^2 = x$ where the tangent line makes an angle $\frac{\pi}{4}$ with x-axis.

Watch Video Solution

208. Write the angle made by the tangent to the curve $x = e^t \cot t$, $y = e^t \sin t$ at $t = \frac{\pi}{4}$ with the x-axis.

Watch Video Solution

209. Write the equation of the normal to the curve $y = x + \sin x \cos x$ at $x = \frac{\pi}{2}$.

Watch Video Solution

210. Find the coordinates of the point on the curve $y^2 = 3 - 4x$ where tangent is parallel to the line $2x + y - 2 = 0$.

Watch Video Solution

211. Write the equation of the tangent to the curve $y = x^2 - x + 2$ at the point where it crosses the y-axis.

Watch Video Solution

212. Write the angle between the curves $y^2 = 4x$ and $x^2 = 2y - 3$ at the point $(1,\ 2)$.

Watch Video Solution

213. Write the angle between the curves $y = e^{-x}$ and $y = e^{x}$ at their point of intersection.

Watch Video Solution

214. Write the slope of the normal to the curve $y = \frac{1}{x}$ at the point $\left(3, \frac{1}{3}\right)$

Watch Video Solution

215. Write the coordinates of the point at which the tangent to the curve $y = 2x^2 - x + 1$ is parallel to the line $y = 3x + 9$.

Watch Video Solution

216. Write the equation of the normal to the curve $y = \cos x$ at $(0,\ 1)$.

Watch Video Solution

217. The equation to the normal to the curve $y = \sin x$ at $(0,\ 0)$ is $x = 0$ (b) $y = 0$ (c) $x + y = 0$ (d) $x - y = 0$

Watch Video Solution

218. Find the equation of the tangent to the curve $y = x - \sin x \cos x$ at $x = \frac{\pi}{2}$

Watch Video Solution

219. The equation of the normal to the curve $y = x(2 - x)$ at the point $(2, 0)$ is

$x - 2y = 2$ (b) $x - 2y + 2 = 0$ (c) $2x + y = 4$ (d) $2x + y - 4 = 0$

Watch Video Solution

220. The point on the curve $y^2 = x$ where tangent makes $45o$ angle with x-axis is $(1/2,\ 1/4)$ (b) $(1/4,\ 1/2)$ (c) $(4,\ 2)$ (d) $(1,\ 1)$

Watch Video Solution

221. If the tangent to the curve $x = a\,t^2,\ \ y = 2at$ is perpendicular to x-axis, then its point of contact is $(a,\ a)$ (b) $(0,\ a)$ (c) $(0,\ 0)$ (d) $(a,\ 0)$

Watch Video Solution

222. The point on the curve $y = x^2 - 3x + 2$ where tangent is perpendicular to $y = x$ is

$(0, 2)$ (b) $(1, 0)$ (c) $(-1, 6)$ (d) $(2, -2)$

Watch Video Solution

223. The point on the curve $y = 12x - x^2$ where the slope of the tangent is zero will be

$(0, 0)$ (b) $(2, 16)$ (c) $(3, 9)$ (d) $(6, 36)$

Watch Video Solution

224. The angle between the curves $y^2 = x$ and $x^2 = y$ at $(1,\ 1)$ is $\frac{\tan^{-1} 4}{3}$ (b) $\frac{\tan^{-1} 3}{4}$ (c) $90o$ (d) $45o$

Watch Video Solution

225. The equation of the normal to the curve $3x^2 - y^2 = 8$ which is parallel to $x + 3y = 8$ is $x - 3y = 8$ (b) $x - 3y + 8 = 0$ (c) $x + 3y \pm 8 = 0$ (d) $x + 3y = 0$

Watch Video Solution

226. The equation of tangent at those points where the curve $y = x^2 - 3x + 2$ meets x-axis are

$x - y + 2 = 0 = x - y - 1$ (b)

$x + y - 1 = 0 = x - y - 2$ (c)

$x - y - 1 = 0 = x - y$ (d)

$x - y = 0 = x + y$

Watch Video Solution

227. The slope of the tangent to the curve $x = t^2 + 3t - 8,\ \ y = 2t^2 - 2t - 5$ at point $(2,\ \ -1)$ is $22/7$ (b) $6/7$ (c) -6 (d) $7/6$

Watch Video Solution

228. At what points the slope of the tangent to the curve $x^2 + y^2 - 2x - 3 = 0$ is zero $(3,\ 0),\ (-1,\ 0)$ (b) $(3,\ 0),\ (1,\ 2)$ (c) $(-1,\ 0),\ (1,\ 2)$ (d) $(1,\ 2),\ (1,\ -2)$

Watch Video Solution

229. The angle of intersection of the curves $xy = a^2$ and $x^2 - y^2 = 2a^2$ is zero $0o$ (b) $45o$ (c) $90o$ (d) $30o$

Watch Video Solution

230. If the curve $ay + x^2 = 7$ and $x^3 = y$ cut orthogonally at $(1,\ 1)$, then a is equal to (a) 1 (b) -6 (c) 6 (d) 0

Watch Video Solution

231. If the line $y = x$ touches the curve $y = x^2 + bx + c$ at a point $(1, 1)$ then $b = 1,\ c = 2$ (b) $b = -1,\ c = 1$ (c) $b = 2,\ c = 1$ (d) $b = -2,\ c = 1$

Watch Video Solution

232. The slope of the tangent to the curve $x = 3t^2 + 1, y = t^3 - 1$ at $x = 1$ is $1/2$ (b) 0 (c) -2 (d) ∞

Watch Video Solution

233. The curves $y = ae^{x}$ and $y = be^{-x}$ cut orthogonally, if $a = b$ (b) $a = -b$ (c) $ab = 1$ (d) $ab = 2$

Watch Video Solution

234. The equation of the normal to the curve $x = a\cos^{3}\theta,\ y = a\,s\in^{3}\theta$ at the point $\theta = \pi/4$ is $x = 0$ (b) $y = 0$ (c) $x = y$ (d) $x + y = a$

Watch Video Solution

235. If the curves $y = 2\,e^{x}$ and $y = ae^{-x}$ intersect orthogonally, then $a =$ $1/2$ (b) $-1/2$ (c) 2 (d) $2e^{2}$

Watch Video Solution

236. The point on the curve $y = 6x - x^{2}$ at which the tangent to the curve is inclined at $\pi/4$ to the line $x + y = 0$ is $(-3,\ -27)$ (b) $(3,\ 9)$ (c) $7/2,\ 35/4)$ (d) $(0,\ 0)$

Watch Video Solution

237. The angle of intersection of the parabola $y^2 = 4\,ax$ and $x^2 = 4ay$ at the origin is $\pi/6$

(b) $\pi/3$ (c) $\pi/2$ (d) $\pi/4$

Watch Video Solution

238. The angle of intersection of the curves $y = 2\,s \in^2 x$ and $y = \cos 2\,x$ at $x = \frac{\pi}{6}$ is

$\pi/4$ (b) $\pi/2$ (c) $\pi/3$ (d) $\pi/6$

Watch Video Solution

239. Any tangent to the curve $y = 2x^7 + 3x + 5$ (a) is parallel to x-axis (b) is parallel to y-axis (c) makes an acute angle with x-axis (d) makes an obtuse angle with x-axis.

Watch Video Solution

240. The point on the curve $9y^2 = x^3$, where the normal to the curve makes equal

intercepts with the axes is $(4, \pm 8/3)$ (b) $(-4, 8/3)$ (c) $(-4, -8/3)$ (d) $(8/3, 4)$

Watch Video Solution

241. The slope of the tangent to the curve $x = t^2 + 3t - 8, \quad y = 2t^2 - 2t - 5$ at the point $(2, -1)$ is $22/7$ (b) $6/7$ (c) $7/6$ (d) $-6/7$

Watch Video Solution

242. The line $y = mx + 1$ is a tangent to the curve $y^2 = 4x$, if the value of m is (a) 1 (b) 2 (c) 3 (d) 1/2

Watch Video Solution

243. The normal at the point (1,1) on the curve $2y + x^2 = 3$is(A) $x + y = 0$ (B) $xy = 0$ (C) $x + y + 1 = 0$(D) $xy = 0$

Watch Video Solution

244. The normal to the curve $x^2 = 4y$passing (1,2) is(A) $x + y = 3$ (B) $xy = 3$ (C) $x + y = 1$ (D) $xy = 1$

Watch Video Solution

Others

1. Show that the curves $\frac{x^2}{a^2 + \lambda_1} + \frac{y^2}{b^2 + \lambda_1} = 1$ and

$\frac{x^2}{a^2+\lambda_2}+\frac{y^2}{b^2+\lambda_2}=1$ intersect at right angles.

View Text Solution