MATHS

BOOKS - MODERN PUBLICATION

CONTINUITY AND DIFFERENTIABILITY

Example

1. Prove that :

every constant function is continous in R

Watch Video Solution

2. Prove that :

the identity function is continuous in R.

Watch Video Solution

3. Discuss the continuity of the function f given by $f(x) = |x|$ at $x = 0$

Watch Video Solution

4. Show that the function 'f' given by:

$f(x) = \begin{cases} x & \text{if} \quad x \geq 1 \\ x^2 & \text{if} \quad x < 1 \end{cases}$ is continous every where on R.

Watch Video Solution

5. Prove that the greatest integer function [x] is continuous at all points except at integral points.

Watch Video Solution

6. Show that f(x) = 2x-|x| is continous at x = 0

Watch Video Solution

7. Test the continuity of the function f(x) at the origin:

f(x)= {:[(|x|/x,x not equals to 0),(0,x=0):}`

Watch Video Solution

8. Find all the points of discontinuity of the function f defined by

$$f(x) = \begin{cases} x + 2 & \text{if } x < 1 \\ 0 & \text{if } x = 1 \\ x - 2 & \text{if } x > 1 \end{cases}$$

Watch Video Solution

9. Show that the function $f(x) = \begin{cases} |x| & x \leq 2 \\ [x] & x > 2 \end{cases}$ is continouous on [0,2]

Watch Video Solution

10. Find a for which the function f defined as

$$\left(f(x) = \left\{\left[\left(a\sin\left(\frac{\pi}{2}\right)(x+1) \quad \text{if} \quad x \leq 0\right], \left[\left(\frac{\tan x - \sin x}{x^3}\right) \quad \text{if} \quad x > 0\right]\right\}\right)$$

is continuous at $(x = 0)$.

Watch Video Solution

11. For what value of k, function $f(x)$ is continuous at x = 0 where

$$f(x) = \begin{cases} \dfrac{1 - \cos 4x}{8x^2} \\ k \end{cases}, \begin{pmatrix} x \neq 0 \\ x = 0 \end{pmatrix}$$

Watch Video Solution

12. For what value of 'a' and 'b', the function 'f' defined as:

$$f(x) = \begin{cases} 3ax + b & \text{if } x < 1 \\ 11 & \text{if } x = 1 \\ 5ax - 2b & \text{if } x > 1 \end{cases}$$ is continuous at x =1

Watch Video Solution

13. Find the value of 'k', for which:

$$f(x) = \left\{\frac{\sqrt{1 + kx} - \sqrt{1 - kx}}{x}, \quad \text{if } -1 \le x < 0\right), \left(\frac{2x + 1}{x - 1}, \quad \text{if } 0 \le x < 1\right)$$

is continuous at x=0

Watch Video Solution

14. If

$$f(x) = \left\{\left(\left(\frac{\sin(a+1)x + 2\sin x}{x}\right), x < 0\right)2, x = 0, \left(\frac{\sqrt{1+bx} - 1}{x}, x > 0\right)\right.$$

is continuous at x = 0, then find the values of a and b.

Watch Video Solution

15. Show that the following function is continuous at x = 0:

$f(x) = x\sin 1.\, x, \, when x \neq 0$ f(0) = 0.

Watch Video Solution

16. Show that the function f defined by $f(x) = |1 - x + |x||$ where x is any real number, is a continuous function.

Watch Video Solution

17. Is f(x) = |x-1|+|x-2| differentiable at x=2?

Watch Video Solution

18. For what values of 'a' and 'b' , the function:

$$f(x) = \begin{cases} x^2 & \text{if} \quad x \le 2 \\ ax + b & \text{if} \quad x > 2 \end{cases}$$ is derivable at x=2?

Watch Video Solution

19. If 'f' is derivable at x =a, find $\lim_{x \to a} \frac{xf(a) - af(x)}{x - a}$

Watch Video Solution

20. Examine the derivability of:

$$f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases} \text{ at x =0}$$

Watch Video Solution

21. Find $\frac{dy}{dx}$ if $ax + by^2 = \cos y$

Watch Video Solution

22. Use chain rule to find $\frac{dy}{dx}$ if $y = \left(\frac{2x - 1}{2x + 1}\right)^2$

Watch Video Solution

23. Differentiate $\cos^2\left(\sqrt{x}\right)$ w.r.t x.

Watch Video Solution

24. Differentiate $\sin\left(\cos\left(x^2\right)\right)$ with respect to x.

Watch Video Solution

25. if $y = \sqrt{\frac{1 - x}{1 + x}}$, prove that : $(1 - x)^2\left(\frac{dy}{dx}\right) + y = 0$

Watch Video Solution

26. If $y = \left\{x + \sqrt{x^2 + a^2}\right)^n$, prove that $\frac{dy}{dx} = \frac{ny}{\sqrt{x^2 + a^2}}$.

Watch Video Solution

27. Find $\frac{dy}{dx}$ in the following: $2x + 3y = \sin x$

Watch Video Solution

28. Find $\frac{dy}{dx}$, if $y + \sin y = \cos x$

Watch Video Solution

29. If x sin (a+y) + sin a cos (a+y) = 0, then prove that : $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

Watch Video Solution

30. If $x^2 + y^2 = 1$,then

Watch Video Solution

31. Differentiate $\sin^{-1}\left(\sqrt{\cos x}\right)$ w.r.t.x, using chain rule.

Watch Video Solution

32. If $y = \sqrt{\cot^{-1}\sqrt{x}}$, find $\frac{dy}{dx}$

Watch Video Solution

33. If $y = \sin\left(2\sin^{-1}x\right)$, show that: $\frac{dy}{dx} = 2\sqrt{\frac{1 - y^2}{1 - x^2}}$

Watch Video Solution

34. If $y = \sec^{-1}\left(\frac{1}{2x^2 - 1}\right)$, then find $\frac{dy}{dx}$, given $0 < x < \frac{1}{\sqrt{2}}$

Watch Video Solution

35. If $y = \sin^{-1}\left[x\sqrt{1-x} - \sqrt{x}\left(\sqrt{1-x^2}\right)\right]$ find $\frac{dy}{dx}$

Watch Video Solution

36. Find $\frac{dy}{dx}$ if $y = \sin^{-1}\left[\frac{6x - 4\sqrt{1-4x^2}}{5}\right]$

Watch Video Solution

37. Prove that : $\frac{d}{dx}\left[\frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)\right] = \sqrt{a^2-x^2}$

Watch Video Solution

38. Prove that: $\frac{d}{dx}\left[\sin^{-1}\sqrt{x}\right] = \frac{1}{2\sqrt{x - x^2}}$

Watch Video Solution

39. Is it true that $x = e^{\log x}$ for all real x?

Watch Video Solution

40. Differentiate the following w.r.tx: 3^{x+2}

Watch Video Solution

41. Differentiate $10^x . x^{10}$ w.r.t.x

Watch Video Solution

42. If $xy = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{y(x-1)}{x(y+1)}$

Watch Video Solution

43. Differentiate $\sin^{-1}\left(\frac{2^{x+1}}{1+4^{x}}\right)$ w.r.t x

Watch Video Solution

44. Differentiate the following with respect to x:

$$\sin^{-1}\left[\frac{2^{x+1}.3^{x}}{1+(36)^{x}}\right]$$

Watch Video Solution

45. Find $\frac{dy}{dx}$, if :

$$y = \log\left((x+2) + \sqrt{x^2+2}\right)$$

Watch Video Solution

46. If $y = \log\tan(\text{pi/4+x/2}), showt\hat{:}$ dy/dx-secx=0`

Watch Video Solution

47. If $y = \log_{10}x + \log_X 10 + \log_x X + \log_{10}10, f \in d\frac{dy}{dx}$

Watch Video Solution

48. Find f'(x), where: $f(x) = \left(1 + x^2\right)I_n(2x)\cdot$

Watch Video Solution

49. Find f'(x), where: $f(x) = \cos(Iogx)^2$ where x > 0

Watch Video Solution

50. If $e^x + e^y = e^{x+y}$, prove that $\frac{dy}{dx} = \frac{e^x\left(e^y - 1\right)}{e^y\left(e^x - 1\right)}$

Watch Video Solution

51. Find the derivative of sin (logx) (x>0) w.r.t.x by Chain Rule

Watch Video Solution

52. Find the derivative of sin (logx) (x>0) w.r.t.x

Watch Video Solution

Watch Video Solution

53. Find $\frac{dy}{dx}$, when: $x = a\frac{1 - t^2}{1 + t^2}, y = b\frac{2t}{I + t^2}$.

Watch Video Solution

54. Find $\frac{dy}{dx}$, when: $x = a(1 - \cos\theta), y = a(\theta + \sin\theta)$

Watch Video Solution

55. Find $\frac{dy}{dx}$ if $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$

Watch Video Solution

56. Find $\frac{dy}{dx}$, when: $x = e^{\theta}\left(\theta + \frac{1}{\theta}\right)$ and $y = e^{-\theta}\left(\theta - \frac{1}{\theta}\right)$

Watch Video Solution

57. Find the value of $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$, if: $x = a\cos(\theta)(\sin\theta - \cos\theta)$and $y = ae^{\theta}(\sin\theta + \cos\theta)$

Watch Video Solution

58. If x = a sin 2 t(1+cos 2t) and y = b cos 2t(1-cos 2t), find: the value of $\frac{dy}{dx}att = \frac{\pi}{4}$ and $t = \frac{\pi}{3}$

Watch Video Solution

59. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = at^2, y = 2at$

Watch Video Solution

Watch Video Solution

60. Differentiate log $(1+\theta)w.r.t.\sin^{-1}\theta.$

Watch Video Solution

61. Differentiate $\sin^{-1}\left(\frac{x}{\sqrt{1+x^2}}\right)$ w.r.t. $\tan^{-1}x.$

Watch Video Solution

62. Differentiate $\sin^{-1}\left(\frac{x}{\sqrt{1+x^2}}w.r.t.\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right)$

Watch Video Solution

63. Differentiate the following w.r.t. as indicated:

$x^2 w.\ r.\ t.\ x^3$

Watch Video Solution

64. Differentiate the following w.r.t. as indicated:

$\frac{ax+b}{cx+d} w.\ r.\ t.\ \frac{a' x+b'}{c' x+d'}$

Watch Video Solution

65. Differentiate the following w.r.t. as indicated:

$e^2 xw.\ r.\ te^x$

Watch Video Solution

66. Differentiate the following w.r.t. as indicated:

$$\frac{x^2}{1+x^2} w.\ r.\ t x^2$$

Watch Video Solution

67. Differentiate the following w.r.t. as indicated:

$$\left(x^{-1}\right)^{4/5} w.\ r.\ t |x|.$$

Watch Video Solution

68. Differentiate the following w.r.t. as indicated:

$$\cos^{-1}\theta,\ w.\ r.\ t.\ \log(1+\theta)$$

Watch Video Solution

69. Differentiate the following w.r.t. as indicated:

$\sin^{-1}\theta, w.r.t. \log(1+\theta)$

Watch Video Solution

70. Differentiate the following w.r.t. as indicated:

$\tan x, w.r.t. \cos x$

Watch Video Solution

71. Differentiate the following w.r.t. as indicated:

$\sec x w.r.t. \operatorname{cosec} x$

Watch Video Solution

72. Differentiate the following w.r.t. as indicated:

$\sin^2 x w.r.t. e^{\cos x}$

Watch Video Solution

73. Differentiate $\cos^{-1}\left(\frac{1}{\sqrt{1+x^2}}\right)$ w.r.t. $\tan^{-1}x$.

Watch Video Solution

74. Differentiate the following w.r.t. as indicated:

$\sin^{-1}\left(2\frac{x}{1+x^2}\right) w.r.t. \tan^{-1}x$

Watch Video Solution

75. Differentiate the following w.r.t. as indicated:

$$\sin^{-1}\left(2\frac{x}{1+x^2}\right) w.r.t. \tan^{-1}\left(2\frac{x}{1-x^2}\right)$$

Watch Video Solution

76. Differentiate the following w.r.t. as indicated:

$$\frac{\tan^{-1}\left(3x-x^3\right)}{1-3x^2} w.r.t. \tan^{-1} - \left(2\frac{x}{1+x^2}\right)$$

Watch Video Solution

77. Differentiate $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$

Watch Video Solution

78. Differentiate the following w.r.t. as indicated:

$$\tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right) w.\ r.\ t.\ \tan^{-1}\left(\frac{x}{\sqrt{1 - x^2}}\right)$$

Watch Video Solution

79. Differentiate the following w.r.t. as indicated:

$$\tan^{-1}\left(\frac{\sqrt{1 + x^2} - 1}{x}\right) w.\ r.\ t.\ \tan^{-1}x$$

Watch Video Solution

80. Differentiate the following w.r.t. as indicated:

$$\tan^{-1}\left(\frac{\sqrt{1 + a^2x^2} - 1}{ax}\right) w.\ r.\ t.\ \tan^{-1}ax$$

Watch Video Solution

81. Differentiate the following w.r.t. as indicated:

$$\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right) w.r.t. \sin^{-1}\left(\frac{2x}{1+x^2}\right)$$

Watch Video Solution

82. Differentiate the following w.r.t. as indicated:

$$\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right). r.t. \sin^{-1}\left(2x\sqrt{1-x^2}\right)$$

Watch Video Solution

83. Differentiate the following w.r.t. as indicated:

$$\tan^{-1}\left(\frac{x}{1+\sqrt{1-x^2}}\right) w.r.t. \sin\left(2\cot^{-1}\sqrt{\frac{1+x}{1-x}}\right)$$

Watch Video Solution

84. Differentiate the following w.r.t. as indicated:

$e^{x} w.r.t. \sqrt{x}$

Watch Video Solution

85. Differentiate the following w.r.t. as indicated:

$\log_{10} x w.r.t. x^{2}$

Watch Video Solution

86. Differentiate the following w.r.t. as indicated:

$\sin x^{2} w.r.t. x^{3}$

Watch Video Solution

87. Differentiate $\sqrt{1 + x^2}$ w.r.t. $\tan^{-1}x$.

Watch Video Solution

88. Prove that derivative of $\tan^{-1}\left(\frac{x}{1 + \sqrt{1 - x^2}}\right)$ w.r.t $\sin^{-1} x$ is independent of x.

Watch Video Solution

89. Prove that derivative of $\tan^{-1}\left(\frac{\sqrt{1 + x^2} - 1}{x}\right)$ w.r.t. $\tan^{-1}x$ is independent of x.

Watch Video Solution

90. Differentiatie tan^-1((sqrt(1+x^2) - sqrt(1-x^2))/(sqrt(1+x^2)+sqrt(1-x^2)))$w.r.t.$ sin^-1((2x)/(1+x^2))`

Watch Video Solution

91. Differentiate $\tan^{-1}\left\{\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right\}$ w.r.t.x

Watch Video Solution

92. Find $\frac{dy}{dx}$ if $y = x^x$

Watch Video Solution

93. Differentiate x^{x^x} w.r.t. x.

Watch Video Solution

Watch Video Solution

94. Find $f'(x)$ if $f(x) = (\sin x)^{\sin x}$ for all `0

Watch Video Solution

95. Differentiate $\left(x^{\tan x} + (\sin x)^{\cos x}\right) w.r.t.x$

Watch Video Solution

96. If $x^y . y^x = 1$, then prove that :

$$\frac{dy}{dx} = \frac{-y(y + x\log x)}{x(y\log x + x)}$$

Watch Video Solution

97. If $x^Y = e^{X-Y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$.

Watch Video Solution

98. If $x^{Y} = e^{X - Y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$.

Watch Video Solution

99. Find $\frac{dy}{dx}$, if $y^x + x^y + x^x = a^b$

Watch Video Solution

100. Differentiate $3^x x^{5 + x} \cos^{-1} x w. r. t. x.$

Watch Video Solution

101. IF f(x) = $\left[\left[\dfrac{3+x}{1+x}\right]^{2+3x}\right]$ find'(0).

Watch Video Solution

102. If $y=\sqrt{2^x+\sqrt{2^x+\sqrt{2^x+\ldots\ldots\ldots\infty}}}$, then prove that : $(2y-1)\dfrac{dy}{dx}=2^x\log 2$.

Watch Video Solution

103. If $y=\sqrt{\log x+\sqrt{\log+x\sqrt{\log x+\ldots\infty}}}$ then find $\dfrac{dy}{dx}$

Watch Video Solution

104. Differentiate the following w.r.t.x.

$y = e^{x^{+ex+ex^{-\text{to}\infty}}}$, prove that $\dfrac{dy}{dx} = \dfrac{y}{1-y}$

Watch Video Solution

105. Find the second derivative of $\sin^{-1}x$

Watch Video Solution

106. If $y = 500e^7x + 600e^{-7}x$ show that $\left(d^2\dfrac{y}{dx^2}\right) = 49y$

Watch Video Solution

107. If $x = a(\cos t + t\sin t)$ and $y = a(\sin t - t\cos t), 0 < t < \frac{\pi}{2}$, find $\frac{d^2x}{dt^2}, \frac{d^2y}{dt^2}$

Watch Video Solution

108. If $x = \tan\left(\frac{1}{2}\log y\right)$, then show that $\left(1 + x^2\right)\frac{d^2y}{dx^2} = (a - 2x)\frac{dy}{dx}$.

Watch Video Solution

109. If $x = a\cos\theta + b\sin\theta$ and $y = a\sin\theta - b\cos\theta$, then prove that $y^2\frac{d^2y}{dx^2} - \frac{dy}{dx} + y = 0$

Watch Video Solution

110. If $y = a\sin(\log x) + b\cos(\log x)$, then prove that : $x^2 d^2 \frac{y}{dx^2} + x\frac{dy}{dx} + y = 0.$

Watch Video Solution

111. If x cos (a+y) = cos y, then prove that $\frac{dy}{dx} = \frac{\cos^2(a+y)}{\sin a}$ Hence, show that $\sin a \frac{d^2y}{dx^2} + \sin 2(a+y)\frac{dy}{dx} = 0$

Watch Video Solution

112. If $x = a\left(\cos\theta + \log\tan\left(\frac{\theta}{2}\right)\right)$ and $y = a\sin\theta$, find the value of $\frac{d^2y}{dx^2} at\theta = \frac{\pi}{4}$

Watch Video Solution

113. IF $y = x^x$, show that $\left[\left(d^2\frac{y}{dx^2}\right) - \frac{1}{y}\left(\frac{dy}{dx}\right)^2 - \frac{y}{x} = 0\right]$

Watch Video Solution

114. If $y = cosec^{-1}x, x > 1,$ then show that : $x\left(x^2 - 1\right)\frac{d^2y}{dx^2} + \left(2x^2 - 1\right)\frac{dy}{dx} = 0$

Watch Video Solution

115. Find the second order derivative of the following functions

If $y = e^{\tan x}$, prove that $\cos^2 x\frac{d^2y}{dx^2} - (1 + \sin 2x)\frac{dy}{dx} = 0$

Watch Video Solution

116. If $y = e^x(\sin x + \cos x)$, prove that $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

Watch Video Solution

117. If $y = e^{2\tan^{-1}x}$, then show that

$$\left(1+x^2\right)^2\frac{d^2y}{dx^2}+2x\left(1+x^2\right)\frac{dy}{dx}=4y$$

Watch Video Solution

118. Verify Rolle's Theorem for the function :

$f(x) = x^2 - x - 12 \in [-3, 4]$

Watch Video Solution

119. Discuss the applicability of Rolle's Theorem for the function

$f(x) = (x-1)^{2/5}$ in the interval [0,3]

Watch Video Solution

120. Let f(x) = x(x-1)(x-2),x ∈ [0,2]. Prove that 'f' satisfies the conditions of Rolle's Theorem and there is more than one 'c' in (0,2) such that f'(C) = 0

Watch Video Solution

121. Verify Rolle's theore for the following functions

$f(x) = \cos 2\left(x - \frac{\pi}{4}\right)$ in the interval $\left[0, \frac{\pi}{2}\right]$.

Watch Video Solution

122. Discuss the applicability of Rolle's Theorem for the function :

$$f(x)\begin{cases}\left(x^2 + 1\right) & whe0 \le x \le 1 \\ 3 - x & when1 < x \le 2\end{cases}$$

Watch Video Solution

123. At what point on the curve y = (cos x -1) in $[0, 2\pi]$, is the tangent parallel to x-axis?

Watch Video Solution

124. It is given that for the function 'f' given by : $f(x) = x^3 + bx^2 + ax, x \in [1, 3]$ Rolle's Theorem holds with $c = 2 + \frac{1}{\sqrt{3}}$. Find the values of 'a' and 'b'.

Watch Video Solution

125. Discuss the applicability of Lagrange's Mean Value Theorem to $f(x) = x(x - 1)(x - 2)$in $\left[0, \frac{1}{2}\right]$

Watch Video Solution

126. Disuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = \cos x \in$ [0,pi/2]`

Watch Video Solution

127. Find 'c' of the Lagrange's Mean Value Theorem whenf(x = x(x-2)

in [1,2]

Watch Video Solution

128. Find a point on the parabola $y = (x - 3)^2$, where the tangent s

parallel to the chord joining (3,0) and (4,1)

Watch Video Solution

129. Lagrange's Theorem to determine a point P on the curve $f(x) = \sqrt{x - 2}$ defined in the interval [2,3], where the tangent is parallel to the chord joining the end points on the curve.

Watch Video Solution

130. Prove that the function f(x) = 5x-3 is continuous at x = 0

Watch Video Solution

131. Examine the continuity of the function $f(x) = 2x^2 - 1$ at $x = 3$

Watch Video Solution

132. Examine the following function for continuity: $f(x) = x - 5$

Watch Video Solution

Watch Video Solution

133. Examine the following function for continuity:

$$f(x) = \frac{1}{x - 5}, x \neq 5$$

Watch Video Solution

134. Examine the following function for continuity:

$$f(x) = \frac{x^2 - 25}{x + 5}, x \neq -5$$

Watch Video Solution

135. Examine the following function for continuity: $f(x) = |x - 5|$

Watch Video Solution

136. Prove that the function $f(x) = x^n$, is continuous at $x = n$, where n is a positive integer.

Watch Video Solution

137. Is the function f defined by $f(x) = \begin{cases} x & \text{if } \quad x \leq 1 \\ 5 & \text{if } \quad x > 1 \end{cases}$ continuous at, x=0?At x=1? At x=2 ?

Watch Video Solution

138. Find all the points of discontinuity of f, where f is defined by

$$f(x) = \begin{cases} 2x + 3, & \text{if } \ x \leq 2 \\ 2x - 3, & \text{if } \ x > 2 \end{cases}$$

Watch Video Solution

139. Find all points of discontinuity of f, where f is defined by : `f(x)= {(|x|+3,,,,if x <= -3),(-2x,,,,if -3=3):}`

Watch Video Solution

140. Find all points of discontinuity of f, where f is defined by :

$$f(x) = \begin{cases} \frac{|x|}{x} & \text{if } \quad x \neq 0 \\ 0 & \text{if } \quad x = 0 \end{cases}$$

Watch Video Solution

141. Find all points of discontinuity of f, where f is defined by:

$$f(x) = \begin{cases} \frac{x}{|x|} & \text{if } \quad x < 0 \\ -1 & \text{if } \quad x \geq 0 \end{cases}$$

Watch Video Solution

142. Find all points of discontinuity of f, where f is defined by

$$f(x) = \begin{cases} x + 1 & \text{if } \; x \geq 1 \\ x^2 + 1 & \text{if } \; x < 1 \end{cases}$$

Watch Video Solution

143. Find all points of discontinuity of f, where f is defined by :

$$f(x) = \begin{cases} x^3 - 3 & x \leq 2 \\ x^2 + 1 & x > 2 \end{cases}$$

Watch Video Solution

144. Find all points of discontinuity of f, where f is defined by

$$f(x) = \begin{cases} x^{10} - 1 & \text{if } \; x \leq 1 \\ x - 5 & \text{if } \; x > 1 \end{cases}$$

Watch Video Solution

145. Discuss the continuity of the function

$$f(x) = \begin{cases} 3, & \text{if } 0 \le x \le 1 \\ 4, & \text{if } 1 < x < 3 \\ 5, & \text{if } 3 \le x \le 10 \end{cases}$$

Watch Video Solution

146. Discuss the continuity of the function f, where f is defined by:

$$f(x) = \begin{cases} 2x & \text{if } x < 0 \\ 0 & \text{if } 0 \le x \le 1 \\ 4x & \text{if } x > 1 \end{cases}$$

Watch Video Solution

147. Find all points of discontinuity of f, where f is defined by f(x) =

(- 2, if $x \le$ -1),(2x,if-1 < x < 1),(2,if $x > 1$) :}

Watch Video Solution

148. Find the relationship between a and b so that the function f defined by: $f(x) = \begin{cases} ax + 1 & \text{if } x \leq 3 \\ bx + 3 & \text{if } x > 3 \end{cases}$ is continuous at $x = 3$

Watch Video Solution

149. For what value of λ is the function defined by $f(x) = \begin{cases} \lambda\left(x^2 - 2x\right) & \text{if } x \leq 0 \\ 4x + 1 & \text{if } x > 0 \end{cases}$ continuous at $x = 0$? What about continuity at $x = 1$?

Watch Video Solution

150. Show that the function defined by $g(x) = x - [x]$ is discontinuous at all integral points. Here $[x]$ denotes the greatest integer less than or equal to x.

Watch Video Solution

151. Is the function defined by $f(x) = x^2 - \sin x + 5$ continuous at $x = \pi$

Watch Video Solution

152. Discuss the continuity of the following function: $f(x) = \sin x + \cos x$

Watch Video Solution

153. Discuss the continuity of the following function: $f(x) = \sin x - \cos x$

Watch Video Solution

Watch Video Solution

154. Discuss the continuity of the following function: $f(x) = \sin x \cdot \cos x$

Watch Video Solution

155. Discuss the continuity of the cosine, cosecant, secant and cotangent functions.

Watch Video Solution

156. Find all points of discontinuity of f, where:

$$f(x) = \begin{cases} \dfrac{\sin x}{x} & \text{if } x < 0 \\ x + 1 & \text{if } x \geq 0 \end{cases}$$

Watch Video Solution

157. Determine if f defined by : $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$ is a continuous function?

Watch Video Solution

158. Discuss the continuity of the following function: $f(x) = \sin x - \cos x$

Watch Video Solution

159. Find the values of k so that the function f is continuous at the indicated point : $f(x) = \begin{cases} k\dfrac{\cos x}{\pi - 2x} & \text{if } x \neq \dfrac{\pi}{2} \\ 3 & \text{if } x = \dfrac{\pi}{2} \end{cases}$ at $x = \dfrac{\pi}{2}$

Watch Video Solution

160. Find the values of k so that the function f is continuous at the indicated point : $f(x) = \begin{cases} kx^2 & \text{if } \ x \leq 2 \\ 3 & \text{if } \ x > 2 \end{cases}$ at $x = 2$

Watch Video Solution

161. Find the values of k so that the function f is continuous at the indicated point : $f(x) = \begin{cases} k\dfrac{\cos x}{\pi - 2x} & \text{if } \ x \neq \dfrac{\pi}{2} \\ 3 & \text{if } \ x = \dfrac{\pi}{2} \end{cases}$ at $x = \dfrac{\pi}{2}$

Watch Video Solution

162. Find the values of k so that the function f is continuous at the indicated point : $f(x) = \begin{cases} kx+1 & \text{if } x \le 5 \\ 3x - 5 & \text{if } x > 5 \end{cases}$ at $x = 5$

Watch Video Solution

163. Find the values of a and b such that the function defined by :

`f(x)={(5,,,, if x le2),(ax+b,,,, if 2

Watch Video Solution

164. Show that the function defined by $f(x) = \cos\left(x^2\right)$ is a continuous function.

Watch Video Solution

165. Show that the function defined by $f(x) = |\cos x|$ is a continuous function.

Watch Video Solution

166. Find all the points of discontinuity of f defined by $f(x) = |x| - |x + 1|$

Watch Video Solution

167. Differentiate the functions with respect to x

$\sin\left(x^2 + 5\right)$

Watch Video Solution

168. Differentiate the functions with respect to x

cos(sinx)

Watch Video Solution

169. Differentiate the functions with respect to x

sin(ax+b)

Watch Video Solution

170. Differentiate the functions with respect to x

$\sec\left(\tan\left(\sqrt{x}\right)\right)$

Watch Video Solution

171. Differentiate the functions with respect to x: $\dfrac{\sin(ax+b)}{\cos(cx+d)}$

Watch Video Solution

172. Differentiate the functions with respect to x

$\cos x^3 . \sin^2\left(x^5\right)$

Watch Video Solution

173. Differentiate the functions with respect to x

$2\sqrt{\cot\left(x^2\right)}$

Watch Video Solution

174. Differentiate the functions with respect to x

$\cos\left(\sqrt{x}\right)$

Watch Video Solution

175. Prove that the function f given by : $f(x) = |x - 1|, x \in R$ is not differentiale at x =1

Watch Video Solution

176. Prove that $f(x) = [x], 0 < x < 3$ is not differentiable at $x = 1$ but $x = 2$.

Watch Video Solution

177. Find $\frac{dy}{dx}$ in the following:

2x+3y = sinx

Watch Video Solution

178. Find $\frac{dy}{dx}$ in the following: $2x + 3y = \sin x$

Watch Video Solution

179. Find $\frac{dy}{dx}$ in the following:

$ax + by^2 = \cos y$

Watch Video Solution

180. Find $\frac{dy}{dx}$ in the following:

$xy + y^2 = \sin x + y$

Watch Video Solution

181. Find $\frac{dy}{dx}$ in the following:

$x^2 + xy + y^2 = 100$

Watch Video Solution

182. Find $\frac{dy}{dx}$ in the following:

$x^3 + x^2y + xy^2 + y^3 = 81$

Watch Video Solution

183. Find $\frac{dy}{dx}$ in the following:

$\sin^2 y + \cos xy = \pi$

Watch Video Solution

184. Find $\frac{dy}{dx}$ in the following:

$\sin^2 x + \cos^2 y = 9$

Watch Video Solution

185. Find $\frac{dy}{dx}$ in the following:

$y = \sin^{-1}\left(2\frac{x}{1 + x^2}\right)$

Watch Video Solution

186. Differentiate the following w.r.t. x:

$\tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right), -\frac{1}{\sqrt{3}} < x < \frac{1}{\sqrt{3}}$

Watch Video Solution

187. Find $\frac{dy}{dx}$ in the following:

$$y = \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right), 0 < x < 1$$

Watch Video Solution

188. Differentiate the following w.r.t. x:

$$\sin^{-1}\left(\frac{1 - x^2}{1 + x^2}\right), 0 < x < 1$$

Watch Video Solution

189. Differentiate the following w.r.t. x:

$$\cos^{-1}\left(2\frac{x}{1 + x^2}\right), \ -1 < x < 1$$

Watch Video Solution

190. Find $\frac{dy}{dx}$ in the following: $y = \sin^{-1}\left(2x\sqrt{1 - x^2}\right), -\frac{1}{\sqrt{2}} < x < \frac{1}{\sqrt{2}}$

Watch Video Solution

191. Find $\frac{dy}{dx}$ in the following:$y = \sec^{-1}\left(\frac{1}{2x^2 - 1}\right), 0 < x < \frac{1}{\sqrt{2}}$

Watch Video Solution

192. Differentiate the following w.r.t. x :

$\frac{e^x}{\sin x}$

Watch Video Solution

193. Differentiate the following w.r.t. x :

$e^{\sin^{-1}x}$

Watch Video Solution

194. Differentiate the following w.r.t. x: $e^{x} \wedge 3$

Watch Video Solution

195. Differentiate the following w.r.t x

$\sin\left(\tan^{-1}\left(e^{-x}\right)\right)$

Watch Video Solution

196. Differentiate the following w.r.t x

$\log\left(\cos\left(e^{x}\right)\right)$

Watch Video Solution

197. Differentiate the following w.r.t. x: $e^{x} + e^{x^{2}} + \ldots. + e^{x^{5}}$

Watch Video Solution

198. Differentiate the following w.r.tx:

$\sqrt{e^{\sqrt{x}}}$, x > 0

Watch Video Solution

199. Differentiate the following w.r.tx:

$\frac{\cos x}{\log x}, x > 0$

Watch Video Solution

200. Differentiate the following w.r.t x

$\cos(\log x + e^x)$, $x > 0$

Watch Video Solution

201. Differentiate the following w.r.t. x :

$\cos x. \cos 2x. \cos 3x$

Watch Video Solution

202. Differentiate the following w.r.t x

$(\log x)^{\cos x}$

Watch Video Solution

203. Differentiate the following w.r.t. x:

$x^x - 2^{\sin x}$

Watch Video Solution

204. Differentiate the following w.r.t.x .

$(x+3)^2(x+4)^3(x+5)^4$

Watch Video Solution

205. Differentiate the following w.r.t. x :

$$\left(x+\frac{1}{x}\right)^{x}+x^{x+\frac{1}{x}}$$

Watch Video Solution

206. Differentiate the following w.r.t. x:

$$(x)^{\log x}+(\log x)^{x}$$

Watch Video Solution

207. Differentiate the following w.r.t. x:

$$(\sin x)^{x}+\sin^{-1}\sqrt{x}$$

Watch Video Solution

208. Differentiate the following w.r.t. x:

$x^{\sin x} + (\sin x)^{\cos x}$

Watch Video Solution

209. Differentiate the function w.r.t. x : $x^{x\cos x} + \frac{x^2 + 1}{x^2 - 1}$

Watch Video Solution

210. Differentiate the following w.r.t. x:

$(x\cos x)^x + (x\sin x)^{1/x}$

Watch Video Solution

211. Find $\frac{dy}{dx}$ of the function : $x^y + y^x = 1$

Watch Video Solution

212. Find $\frac{dy}{dx}$,if $y^x = x^y$

Watch Video Solution

213. Find $\frac{dy}{dx}$of the function :$(\cos x)^y = (\cos y)^x$

Watch Video Solution

214. Find $\frac{dy}{dx}$of the function :$xy = e^{x - y}$

Watch Video Solution

215. Find the derivative of the function given by $f(x) = (1 + x)\left(1 + x^2\right)\left(1 + x^4\right)\left(1 + x^8\right)$ and hence find $f'(1)$

Watch Video Solution

216. Differentiate $\left(x^2 - 5x + 8\right)\left(x^3 + 7x + 9\right)$ by using product rule.

Watch Video Solution

217. Differentiate $\left(x^2 - 5x + 8\right)\left(x^3 + 7x + 9\right)$ by expanding the product to obtain a single polynomial.

Watch Video Solution

218. Differentiate $\left(x^2 - 5x + 8\right)\left(x^3 + 7x + 9\right)$ by logarithmic differentiation.

Watch Video Solution

219. If u, v and w are functions of x, then show that `d/dx(u cdot v cdot w) = du/dx (v cdotw + u cdot dv/dx cdot w +u cdot v dw/dx) in two ways - first by repeated application of product rule, second by logarithmic differentiation.

Watch Video Solution

220. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = 2at^2, y = at^4$

Watch Video Solution

221. If x and y are connected parameterically by the equation , without eliminating the parameter , find $\frac{dy}{dx}$

$x = a\cos(\theta), y = b\sin(\theta)$

Watch Video Solution

222. Find $\frac{dy}{dx}$ if $x = \sin t$ and $y = \cos 2t$.

Watch Video Solution

223. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = 4t, y = \frac{4}{t}$

Watch Video Solution

224. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x\cos\theta - \cos 2\theta, y = \sin\theta - \sin 2\theta$

Watch Video Solution

225. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$

Watch Video Solution

226. If x and y are connected parametrically by the equations given in Exercises 1 to 10, without eliminating the parameter, Find $\frac{dy}{dx}$:

$x = a\left(\text{cos}t + \frac{\text{logtan}t}{2}\right)y = a\text{sin}t$

Watch Video Solution

227. If x and y are connected parametrically by the equation , without eliminating parameter , find $\frac{dy}{dx}$

$x = a\text{sec}(\theta), y = b\text{tan}(\theta)$

Watch Video Solution

228. If x and y are connected parametrically by the equations given in Exercises 1 to 10, without eliminating the parameter, Find $\frac{dy}{dx}$:

$x = a(\text{cos}\theta + \theta\text{sin}\theta), y = a(\text{sin}\theta - \theta\text{cos}\theta)$

Watch Video Solution

229. Find $\frac{dy}{dx} = -\frac{y}{x}$ if $x = \sqrt{a^{\sin^{-1}t}}, y = \sqrt{a^{\cos^{-1}t}}$

Watch Video Solution

230. Find the second order derivatives of the function : $x^2 + 3x + 2$

Watch Video Solution

231. Find the second order derivatives of the function: x^{20}

Watch Video Solution

232. Find the second order derivatives of the function : $x \cdot \cos x$

Watch Video Solution

233. Find the second order derivatives of the function : $\log x$

Watch Video Solution

234. Find the second order derivatives of the function : $x^3 \log x$

Watch Video Solution

235. Find the second order derivatives of the function : $e^x \sin 5x$

Watch Video Solution

236. Find the second order derivatives of the function : $e^{6x} \cos 3x$

Watch Video Solution

237. Find the second order derivatives of the function : $\tan^{-1}x$

Watch Video Solution

238. Find the second order derivatives of the function : $\log(\log x)$

Watch Video Solution

239. Find the second order derivatives of the function : $\sin(\log x)$

Watch Video Solution

240. $y = 5\cos x - 3\sin x$, prove that $\frac{d^2y}{dx^2} + y = 0$

Watch Video Solution

241. If $y = \cos^{-1}x$ Find $\left(d^2\frac{y}{dx^2}\right)$ in terms of y alone.

Watch Video Solution

242. If $y = 3\cos(\log x) + 4\sin(\log x)$ show that $x^2y_2 + xy_1 + y = 0$

Watch Video Solution

243. If $y = Ae^{mx} + Be^{nx}$, Show that $\left(\frac{d^2}{dx^2}y\right) - (m+n)\frac{dy}{dx} + mny = 0$

Watch Video Solution

244. If $y = 500e^{7x}$, show that $\frac{d^2y}{dx^2}$ = 49 y

Watch Video Solution

245. If $e^{y}(x+1)=1$ show that $\left(d^2\frac{y}{dx^2}\right)=\left(\frac{dy}{dx}\right)^2$ ਹੈ।

Watch Video Solution

246. If $y=\left[\tan^{-1}x\right]^2$, then prove that : $\left(x^2+1\right)^2 y_2+2x\left(x^2+1\right)y_1=2.$

Watch Video Solution

247. Verify Rolle's theorem for the function $f(x)=x^2+2x-8, x\in[-4,2]$

Watch Video Solution

248. Examine if Rolle's theorem is applicable to any of the following functions. Can you say some thing about the converse of Rolle's theorem from these example? $f(x) = [x]$ for $x \in [5, 9]$

Watch Video Solution

249. Examine if Rolle's theorem is applicable to any of the following functions. Can you say some thing about the converse of Rolle's theorem from these example?$f(x) = [x]$ for $x \in [-2, 2]$

Watch Video Solution

250. Examine if Rolle's theorem is applicable to any of the following functions. Can you say some thing about the converse of Rolle's theorem from these example? $f(x) = x^2 - 1$ for $x \in [1, 2]$

Watch Video Solution

251. If $f:[-5,5] \to R$ is a differentiable function and if $f'(x)$ does not vanish anywhere, then prove that $f(-5) \neq f(5)$

Watch Video Solution

252. Verify Mean Value Theorem, if $f(x) = x^2 - 4x - 3$, in the interval [a, b], where a = 1 and b = 4.

Watch Video Solution

253. Examine the applicability of Mean Value Theorem for all three functions given in the above exercise 2. (i) f(x) = [x] for x ∈ [5,9] (ii) f(x) = [x] for x ∈ [-2,2] (iii) f(x) = [xsqrt -1] for x ∈ [1,2]

Watch Video Solution

254. Differentiate w.r.t. x the function : $\left(3x^2 - 9x + 5\right)^9$

Watch Video Solution

255. Differentiate w.r.t. x the function : $\sin^3 x + \cos^6 x$

Watch Video Solution

256. Differentiate w.r.t. x the function : $(5x)^{3\cos 2x}$

Watch Video Solution

257. Differentiate w.r.t. x the function : $\sin^{-1}\left(x\sqrt{x}\right), 0 \le x \le 1$

Watch Video Solution

258. Differentiate w.r.t. x the function : $\dfrac{\cos^{-1}\left(\frac{x}{2}\right)}{\sqrt{2x+7}}$, x lies between -2 and 2

Watch Video Solution

259. Differentiate w.r.t. x the function : $(\log x)^{\log x}, x > 1$

Watch Video Solution

260. Differentiate w.r.t. x the function : $\cos(a\cos x + b\sin x)$, for some constant a and b.

Watch Video Solution

261. Differentiate w.r.t. x the function : $(\sin x - \cos x)^{\sin x - \cos x}, x lies between \frac{\pi}{4}$ and $3\frac{\pi}{4}$

Watch Video Solution

262. Differentiate w.r.t. x the function : $x^x + x^a + a^x + a^a$, for some fixed $a > 0$ and $x > 0$

Watch Video Solution

263. Differentiate w.r.t. x the function : $x^{x^2 - 3} + (x - 3)^{x^2}, f$ or $x > 3$

Watch Video Solution

264. Find dy/dx if y =12(1-cost), x =10(t-sint)

Watch Video Solution

Watch Video Solution

265. Find $\frac{dy}{dx}$ if $y = \sin^{-1}x + \sin^{-1}\sqrt{1 - x^2}, 0 < x < 1$

Watch Video Solution

266. If $x\sqrt{1 + y} + y\sqrt{1 + x} = 0$ then $\frac{dy}{dx}$ equals.

Watch Video Solution

267. If $\cos y = x\cos(a + y)$, with $\cos a \neq \pm 1$, prove that $\frac{dy}{dx} = \frac{\cos^2(a + y)}{\sin a}$

Watch Video Solution

268. If $x = a(\cos t + t\sin t)$ and $y = a(\sin t - t\cos t)$, find $\frac{d^2y}{dx^2}$

Watch Video Solution

269. If $f(x) = |x|^3$ show that $f''(x)$ exists for all real x and find it.

Watch Video Solution

270. Using mathematical induction prove that $d\frac{x^n}{dx} = nx^{n-1}$ for all positive integers n.

Watch Video Solution

271. Using the fact that $\sin(A + B) = \sin A\cos B + \cos A\sin B$ and the differentiation, obtain the sum formula for cosines.

Watch Video Solution

272. Does there exist a function which is continuous everywhere but not differentiable at exactly two points? Justify your answer.

Watch Video Solution

273. If $y = \begin{vmatrix} f(x) & g(x) & h(x) \\ 1 & m & n \\ a & b & c \end{vmatrix}$, prove that $\frac{dy}{dx} = \begin{vmatrix} f'(x) & g'(x) & h'(x) \\ l & m & n \\ a & b & c \end{vmatrix}$

Watch Video Solution

274. If $y = e^{a\cos^{-1}x}, -1 \leq x \leq 1,$ show that $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\left(\frac{dy}{dx}\right) - a^2y = 0$

Watch Video Solution

275. If $f(x) = \begin{cases} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2} & x \neq 2 \\ k & x = 2 \end{cases}$ is continuous at x =2, find the value of 'k'.

Watch Video Solution

276. The derivative of f(x) =|x | at x=0 is

Watch Video Solution

277. If $y = \tan x + \sec x$, prove that $\frac{d^2y}{dx^2} = \frac{\cos x}{(1 - \sin x)^2}$

Watch Video Solution

278. If $f(x) = \dfrac{\sqrt{2}\cos x - 1}{\cot x - 1}, x \neq \dfrac{\pi}{4}$, find the value of $f\left(\dfrac{\pi}{4}\right)$ so that f(x) becomes continuous at $x = \dfrac{\pi}{4}$

Watch Video Solution

279. Examine the differentiability of the function 'f' defined by:

$$f(x) = \begin{cases} 2x + 3 & \text{if } \; -3 \leq x < -2 \\ x + 1 & \text{if } \; -2 \leq x < 0 \\ x + 2 & \text{if } \; 0 \leq x \leq 1 \end{cases}$$

Watch Video Solution

280. Differentiate $\left[\tan^{-1}\left\{\dfrac{\sqrt{1 - x^2}}{x}\right\}\right]$ with respect to $\left[\cos^{-1}\left\{2x\sqrt{1 - x^2}\right\}\right]$

Watch Video Solution

281. If $f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ Show that 'f' is not differentiable at x =0

Watch Video Solution

282. Show that $f(x) = \begin{cases} \text{x } \sin\frac{1}{x}, & \text{when} \quad x \neq 0 \\ 0, & \text{when} \quad x = 0 \end{cases}$ is continuous but not differentiable at x = 0

Watch Video Solution

283. If $f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ Show that 'f' is not differentiable at x =0

Watch Video Solution

284. Show that $f(x) = \begin{cases} |2x - 3|[x] & x \geq 1 \\ \sin\left(\frac{\pi x}{2}\right) & x < 1 \end{cases}$ is continuous but not differentiable at x =1.

Watch Video Solution

285. Does there exist a function which is continuous everywhere but not differentiable at exactly two points? Justify your answer.

Watch Video Solution

286. Is |sinx| differetiable? What about cos|x|?

Watch Video Solution

287. Find the derivative of $\frac{\sin^{-1}x}{x} w.r.t.x.$

Watch Video Solution

288. Differentiate the following w.r.t. x:

$$\sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}}$$

Watch Video Solution

289. Differentiate the following w.r.tx:

$e^{\sec^2 x} + 3\cos^{-1}x$

Watch Video Solution

290. Differentiate the following w.r.t x

$\left(3x^2 - 9x + 5\right)^9$

Watch Video Solution

291. Differentiate the following w.r.t. x: $\sin^3 x + \cos^6 x$

Watch Video Solution

292. Differentiate the following w.r.t. x: $e^{\log x}$

Watch Video Solution

Watch Video Solution

293. Differentiate the following w.r.t. x: $e^{2\log x+3}$

Watch Video Solution

294. Prove that $\cot^{-1}x+\cot^{-1}\left(\frac{1}{x}\right)$ is a constant.

Watch Video Solution

295. If $y=f\left(\frac{2x-1}{x^2+1}\right)$ and $f'(x)=\sin x^2$, then find $\frac{dy}{dx}$.

Watch Video Solution

296. Find the derivative of the following w.r.t x,

$$\log\left(\frac{1}{\sqrt{x}}\right) + 5x^a - 3a^x + \sqrt[3]{x^{-2}} + 6\sqrt[4]{x^{-3}}$$

Watch Video Solution

297. If $y = \tan^{-1}\left(\frac{e^{2x}+1}{e^{2x}-1}\right)$, prove that : $\frac{dy}{dx} = -\frac{2e^{2x}}{1+e^{4x}}$

Watch Video Solution

298. If the derivative of $\tan^{-1}(a+bx)$ takes the value 1 at x =0, prove that $1 + a^2 = b$

Watch Video Solution

299. Using the fact that $\sin(A + B) = \sin A\cos B + \cos A\sin B$ and the differentiation, obtain the sum formula for cosines.

Watch Video Solution

300. If $\sqrt{y + x} + \sqrt{y - x} = c$, where $c \neq 0$, then $\frac{dy}{dx}$ has the value equal to

Watch Video Solution

301. If $\sin x = y\sin(x + b)$, show that $\frac{dy}{dx} = \frac{\sin b}{\sin^2(x + b)}$

Watch Video Solution

302. If x sin (a+y) + sin a cos (a+y) = 0, then prove that : $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

Watch Video Solution

303. If $y = x\sin(a+y)$, prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin(a+y) - y\cos(a+y)}$

Watch Video Solution

304. Differentiate log [log(logx)] w.r.t. x.

Watch Video Solution

305. If $y = e^{x^{e^2}}$ Find : $\frac{dy}{dx}$

Watch Video Solution

306. Find $\frac{dy}{dx}$ when :

$$y = x^{\sin x - \cos x} + \frac{x^2 - 1}{x^2 + 1}$$

Watch Video Solution

307. Find $\frac{dy}{dx}$ when :

$$y = x^{\cot x} + \frac{2x^2 - 3}{x^2 + x + 2}$$

Watch Video Solution

308. If $y = x^{x^x}$ prove that $\frac{dy}{dx} = x^{x + x^x}\left[\frac{1}{x} + (1 + \log x)\log x\right]$

Watch Video Solution

309. If $y = (\tan x)^{\tan x^{\tan x}}$, then prove that$\left(\frac{dy}{dx} = 2\right) at x = \frac{\pi}{4}$

Watch Video Solution

310. Differentiate tan x tan 2 x tan 3 x tan 4 x in two ways: by taking logarithms.

Watch Video Solution

311. Differentiate tan x tan 2 x tan 3 x tan 4 x in two ways: by repeatedly applyng product rule.

Watch Video Solution

312. if $x = \sec\theta - \cos\theta$ and $y = \sec^n\theta - \cos^n\theta$, then show that

$$\left(x^2 + 4\right)\left(\frac{dy}{dx}\right)^2 = n^2\left(y^2 + 4\right)$$

Watch Video Solution

313. For what choices of a,b,c if any , does the function

$$f(x) = \begin{cases} ax^2 + bx + c & 0 \le x \le 1 \\ bx - c & 1 \le x \le 2 \\ c & x > 2 \end{cases}$$ become differentiable at x =1

andx=2?

Watch Video Solution

314. Using mathematical induction prove that $d\frac{x^n}{dx} = nx^{n-1}$ for all positive integers n.

Watch Video Solution

315. If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, prove that

$C_1 + 2C_2 + 3C_3 + \ldots + nC_n = n \cdot 2^{n-1}$

Watch Video Solution

316. If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots\ldots\ldots + C_nx^n$, then prove that :

$C_1 - 2C_2 + \ldots\ldots\ldots\ldots + (-1)^{n-1}nC_n = 0$

Watch Video Solution

317. Are the following functions continuous at each point of their domains? e^x

Watch Video Solution

318. Are the following functions continuous at each point of their domains? Sinx

Watch Video Solution

319. Prove that the following functions are continuous at all points of their domains: f(x) = cos x

Watch Video Solution

320. The greatest integer function [x] is continous everywhere?..

Watch Video Solution

321. Find $\frac{dy}{dx}$ when 2x+3y = cos x.

Watch Video Solution

322. The derivative of $\cos^{-1}x$ is..........

Watch Video Solution

323. Differentiate $e^{\sin^{-1}x}, w.r.t.x$

Watch Video Solution

324. If $y = \log\left(\cos e^{x}\right)$, then $\frac{dy}{dx} = \ldots\ldots\ldots$

Watch Video Solution

325. Find $\frac{d^2y}{dx^2}$ when y = log x +x.

Watch Video Solution

326. Find $\frac{d^2y}{dx^2}$ when $y = e^x + \cos x$

Watch Video Solution

327. Verify Rolle's theorem for f(x)= x, x $\in$ [1,2]

Watch Video Solution

328. Verify LMV theorem : $f(x) = x(x - 2) \in [1, 3]$.

Watch Video Solution

Exercise

1. If $f(x) = \begin{cases} kx^2 & x < 2 \\ 3 & x \geq 2 \end{cases}$ is continuous at x = 2, then the value of 'k' is :

Watch Video Solution

2. Check the continuity of the function f given by $f(x) = 2x + 3$ at $x = 1$

Watch Video Solution

3. Check the continuity of the following functions: $f(x) = x^2 atx = 0$

Watch Video Solution

4. Examine the continuity of the function $f(x) = 2x^2$ - 1 at $x = 3$

Watch Video Solution

5. Examine the function $f(x) = 2x^2 - 5$ for its continuity at the point x = 3.

Watch Video Solution

6. Is the function defined by f(x) = |x|, a continuous function?

Watch Video Solution

7. Find the point at which the function f(x) = [x] is not continuous in (-1,4). ([x] is the largest function).

Watch Video Solution

8. Examine the following function for continuity: $f(x) = x - 5$

Watch Video Solution

9. Examine the following functions for continuity: $f(x) = x^3 + x^2 - 1$

Watch Video Solution

10. Examine the following function for continuity: $f(x) = \dfrac{1}{x - 5}, x \neq 5$

Watch Video Solution

11. Examine the following function for continuity: $f(x) = \dfrac{x^2 - 25}{x + 5}, x \neq -5$

Watch Video Solution

12. Examine the following function for continuity: $f(x) = |x - 5|$

Watch Video Solution

13. Prove that the following functions are continuous at all points of their domains: f(x) = cos x

Watch Video Solution

14. Prove that the following functions are continuous at all points of their domains: $f(x) = e^{x} + e^{-x}$

Watch Video Solution

15. Prove that the following functions are continuous at all points of their domains: $f(x) = \tan x$

Watch Video Solution

16. Discuss the continuity of the following function:

$f(x) = \sin x + \cos x$

Watch Video Solution

17. Discuss the continuity of the following function:

$f(x) = \sin x \cdot \cos x$

Watch Video Solution

18. Discuss the continuity of the following function:

$f(x) = \sin x \cdot \cos x$

Watch Video Solution

19. Discuss the continuity of the following functions:

$$f(x) = \frac{\sin x}{\cos x}$$

Watch Video Solution

20. Prove that $f(x) = |\sin x|$ is continous at all point of its domnin.

Watch Video Solution

21. Examine if sin |x| is a continuous function.

Watch Video Solution

22. Is the function defined by $f(x) = x^2 - \sin x + 5$ continuous at $x = \pi$

Watch Video Solution

Watch Video Solution

23. Show that $fx) = x - |x|, x \in R$ is continuous at x=0

Watch Video Solution

24. Find all points of discontinuity of f, where f is defined by :

$$f(x) = \begin{cases} x + 1 & x \geq 1 \\ x^2 + 1 & x < 1 \end{cases}$$

Watch Video Solution

25. Find all points of discontinuity of f, where f is defined by :

$$f(x) = \begin{cases} x^3 - 3 & x \leq 2 \\ x^2 + 1 & x > 2 \end{cases}$$

Watch Video Solution

26. Find all points of discontinuity of f, where f is defined by :

$$f(x) = \begin{cases} x^{10} - 1 & x \leq 1 \\ x^2 & x > 1 \end{cases}$$

Watch Video Solution

27. Find all the points of discontinuity of f, where f is defined by

$$f(x) = \begin{cases} 2x + 3, & \text{if } x \leq 2 \\ 2x - 3, & \text{if } x > 2 \end{cases}$$

Watch Video Solution

28. Find all points of discontinuity of f, where f is defined by :

$$f(x) = \begin{cases} \dfrac{|x|}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$$

Watch Video Solution

29. Find all points of discontinuity of f, where f is defined by:

$$f(x) = \begin{cases} \dfrac{x}{|x|} & \text{if } x < 0 \\ -1 & \text{if } x \geq 0 \end{cases}$$

Watch Video Solution

30. Discuss the continuity of the function defined by:

$$\begin{cases} x + 5 & \text{if } x \leq 1 \\ x - 5 & \text{if } x > 1 \end{cases}$$

Watch Video Solution

31. Is the function f defined by $f(x) = \begin{cases} x & \text{if } x \leq 1 \\ 5 & \text{if } x > 1 \end{cases}$

continuous at, x=0?At x=1? At x=2 ?

Watch Video Solution

32. Show that the function:

$$\begin{cases} x^3+3 & \text{if} \quad x \neq 0 \\ 1 & \text{if} \quad x = 0 \end{cases}$$ is not continuous at x = 0.

Watch Video Solution

33. Discuss the continuity of the function f defined by

$$f(x) = \frac{1}{x}, x \neq 0$$

Watch Video Solution

34. Discuss the continuity of the function f given by:

$$f(x) = \begin{cases} x & \text{if} \quad x \geq 0 \\ x^2 & \text{if} \quad x < 0 \end{cases}$$

Watch Video Solution

35. Discuss the continuity of the function defined by:

$$f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ -x + 2 & \text{if } x > 0 \end{cases}$$

Watch Video Solution

36. Discuss the continuity of the function:

$$f(x) = \begin{cases} 1 + x^2 & 0 \le x \le 1 \\ 2 - x & x > 1 \end{cases} \text{ at } x = 1$$

Watch Video Solution

37. Examine the continuity of the function $f(x) = \begin{cases} x + 1 & x \le 2 \\ 2x - 1 & x > 2 \end{cases}$ at x = 2

Watch Video Solution

38. Discuss the continuity of the function $f(x)$ at $x = 5$, if

$$f(x) = \begin{cases} \dfrac{x^2 - 25}{x - 5}, & \text{if } x \neq 5 \\ 10, & \text{if } x = 5 \end{cases}$$

Watch Video Solution

39. Discuss the continuity of the function

$$f(x) = \begin{cases} \dfrac{|x-2|}{2-x}, & x \neq 2 \\ -1, & x = 2 \end{cases} \text{ at } x = 2.$$

Watch Video Solution

40. Discuss the continuity of the function

$$f(x) = \begin{cases} \dfrac{|x-2|}{2-x}, & x \neq 2 \\ -1, & x = 2 \end{cases} \text{ at } x = 2.$$

Watch Video Solution

41. Discuss the continuity of the function :

$$f(x) = \begin{cases} \dfrac{|x-a|}{x-a} & when x \neq a \\ 1 & when x = a \end{cases}$$ at x = a

Watch Video Solution

42. Discuss the continuity of the function :

$$f(x) = \begin{cases} -2 & \text{if } \ 0 \leq x \leq 1 \\ 4 & \text{if } \ 1 < x < 3 \\ 5 & \text{if } \ 3 \leq x \leq 10 \end{cases}$$

Watch Video Solution

43. Differentiation of the function :

$f(x) = 4x + 3$

Watch Video Solution

44. Show that the following function are continuous at x=0:

$f(x) = |x|\cos\left(\frac{1}{x}\right)f$ or $x \neq 0$ f(0) = 0

Watch Video Solution

45. Show that the following function are continuous at x=0:

$$f(x) = \begin{cases} x\cos\left(\frac{1}{x}\right) & when x \neq 0 \\ 0 & when x = 0 \end{cases}$$

Watch Video Solution

46. Test the continuity of the following functions at indicated points :

$$f(x) = \begin{cases} x^2 \sin\frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases} \text{ at } x = 0$$

Watch Video Solution

47. Examine the continuity of the function 'f' at x = 0, if `f(x) ={(x sin(1/x)),(0):}, ((x ne 0),(x = 0))

Watch Video Solution

48. Examine the continuity of the function f(x) at x = 0,

$$f(x) = \begin{cases} \frac{|\sin x|}{x} & when x \neq 0 \\ 1 & when x = 0 \end{cases}$$

Watch Video Solution

Watch Video Solution

49. Discuss the continuity of the function defined by

$$f(x) = \begin{cases} \frac{\tan 2x}{3x}, & x \neq 0 \\ \frac{3}{2}, & x = 0 \end{cases}$$

Watch Video Solution

50. Discuss the continuity of the cosine, cosecant, secant and cotangent functions.

Watch Video Solution

51. Test the continuity of the following functions at indicated points :

$$f(x) = \begin{cases} (x - a)\cos\frac{1}{x - a}, & x \neq a \\ 0, & x = a \end{cases} \text{ at } x = a$$

Watch Video Solution

52. Examine the function for continuity at x = 0:

$$f(x) = \begin{cases} \frac{\sin x}{x} & when x < 0 \\ x + 1 & when x \geq 0 \end{cases}$$

Watch Video Solution

53. Discuss the continuity of f(x) at x = 0 if:

$$f(x) = \begin{cases} \frac{\sqrt{1 + x} - \sqrt{1 - x}}{\sin x} & when x \neq 0 \\ 0 & when x = 0 \end{cases}$$

Watch Video Solution

54. In the following, determine the constant so that given function is continuous at indicated point:

$$f(x) = \begin{cases} kx^2 & \text{if} \quad x \le 2 \\ 2 & \text{if} \quad x > 2 \end{cases}$$ at x =2

Watch Video Solution

55. In the following, determine the constant so that given function is continuous at indicated point:

$$f(x) = \begin{cases} kx + 1 & \text{if} \quad x \le \pi \\ \cos x & \text{if} \quad x > \pi \end{cases}$$ at x =π

Watch Video Solution

56. In the following, determine the constant so that given function is continuous at indicated point:

$f(x) = \{(kx + 5, when x \le 2), (x - 1), when x > 2)$ at x =2

Watch Video Solution

57. In the following, determine the constant so that given function is continuous at indicated point:

$f(x) = \{(3k - 2x, whenx < 1), (2k + 1, whenx \geq 1)atx = 1$

Watch Video Solution

58. In the following, determine the constant so that given function is continuous at indicated point:

`f(x) ={:{(3x-8,ifx≤5),(2k,ifx>5):} at x=5

Watch Video Solution

59. In the following, determine the constant so that given function is continuous at indicated point:

$$f(x) = \begin{cases} \frac{\sin 2x}{5x} & when x \neq 0 \\ m & when x = 0 \end{cases} \text{ at } x = 0$$

Watch Video Solution

60. Find the values of k so that the function f is continuous at the indicated point : $f(x) = \begin{cases} k\frac{\cos x}{\pi - 2x} & \text{if } x \neq \frac{\pi}{2} \\ 3 & \text{if } x = \frac{\pi}{2} \end{cases}$ at $x = \frac{\pi}{2}$

Watch Video Solution

61. In the following, determine the constant so that given function is continuous at indicated point:

$$f(x) = \begin{cases} \frac{x^2 - 3x + 2}{x - 1} & \text{if } x \neq 1 \\ k & \text{if } x = 1 \end{cases} \text{ at } x = 1$$

Watch Video Solution

62. In the following, determine the constant so that given function is continuous at indicated point:

$$f(x) = \begin{cases} \frac{x^2 - 1}{x - 1} & \text{if } x \neq 1 \\ k & \text{if } x = 1 \end{cases} \text{ at x =1}$$

Watch Video Solution

63. For what value of 'k' is the function defined by $f(x) = \begin{cases} k\left(x^2 + 2\right) & \text{if } x \leq 0 \\ 3x + 1 & \text{if } x > 0 \end{cases}$ continuous at x =0? Also write whether the function is continuous at x =1.

Watch Video Solution

64. If the function defined by :

$$f(x)=\begin{cases}2x-1 & x<2\\ a & x=2\\ x+1 & x>2\end{cases}$$ is continuous at x =2, find the value of 'a'. Also

discuss the continuity of f(x) at x =3.

Watch Video Solution

65. If the following function f(x) is continuous at x = 0, find the value of 'a':

$$f(x)=\left\{\left(\frac{1-\cos 4x}{x}2, x<0\right), (a, x=0), \left(\left(\frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4, x>0}\right.\right.\right.$$

Watch Video Solution

66. Determine the constants 'a' and 'b' so that the function 'f' defined below is continuous everywhere:

$f(x) = \{(5, \quad \text{if} \quad , x \le 2)(ax + b, \quad \text{if} \quad , 2 < x < 10)(21, \quad \text{if} \quad , x \ge 10)$

Watch Video Solution

67. Determine the constants 'a' and 'b' so that the function 'f' defined below is continuous everywhere:

$$f(x) = \begin{cases} x + 2 & x \le 2 \\ ax + b & 2 < x < 5 \\ 3x - 2 & x \ge 5 \end{cases}$$

Watch Video Solution

68. If the function f(x) given by:

$f(x) = \begin{cases} 2ax + b & \text{if} \quad x > 1 \\ 9 & \text{if} \quad x = 1 \\ 6ax - 2b & \text{if} \quad x < 1 \end{cases}$ is continuous at x =1, find the values 'a' and 'b'.

Watch Video Solution

69. Find the values of a and b so that the following function is continuous at x = 3 and x=5:

$$f(x) = \begin{cases} 1 & \text{if } x \leq 3 \\ ax + b & \text{if } 3 < x < 5 \\ 7 & \text{if } 5 \leq x \end{cases}$$

Watch Video Solution

70. Find 'a' and 'b' if the function:

$$f(x) = \begin{cases} \dfrac{\sin x}{x} & -2 \leq x < 0 \\ a.2^x & 0 \leq x \leq 1 \\ b + x & 1 < x \leq 2 \end{cases}$$ is a continuous function on [-2,2]

Watch Video Solution

71. Find the values of 'p' and 'q' for which:

$$f(x) = \left\{\left(\frac{1 - \sin^3 x}{3\cos^2 x}, \quad \text{if} \quad x < \frac{\pi}{2}\right), \left(p, \quad \text{if} \quad x = \frac{\pi}{2}, \left(\frac{q(1 - \sin x)}{(\pi - 2x)^2}, \quad \text{if} \quad x > \frac{\pi}{2}\right.\right.\right.$$

is continuous at x = $\pi/2$

Watch Video Solution

72. The funtion f(x) is defined as follows:

$$f(x) = \begin{cases} x^2 + ax + b & 0 \le x < 2 \\ 3x + 2 & 2 \le x \le 4 \\ 2ax + 5b & 4 < x \le 8 \end{cases}$$ If f(s) is continuous on [0,8], find the values of 'a' and 'b'.

Watch Video Solution

73. A man is driving a car on the dangerous path given by:

$$f(x) = \begin{cases} \dfrac{1 - x^m}{1 - x} & x \neq 1 \\ m - 1 & x = 1 \end{cases}, m \in N.$$ Find the dangerous point (point of discontinuity) on the path. Whether the driver should pass that point on not? Justify your answer?

Watch Video Solution

74. Find all the points of discontinuity of the function f defined by

$$f(x) = \begin{cases} x + 2 & \text{if } x < 1 \\ 0 & \text{if } x = 1 \\ x - 2 & \text{if } x > 1 \end{cases}$$

Watch Video Solution

75. Find all points of discontinuity of f, where f is defined by : `f(x)= {(|x|+3,,,,if x <= -3),(-2x,,,,if -3=3):}`

Watch Video Solution

76. Find all the points of discontinuity of f, where f is defined by

$$f(x) = \begin{cases} 2x + 3, & \text{if } x \le 2 \\ 2x - 3, & \text{if } x > 2 \end{cases}$$

Watch Video Solution

77. Show that the following functions are continuous:

$$f(x) = \sin\left(x^2\right)$$

Watch Video Solution

78. Show that the following functions are continuous:

$f(x) = \cos\left(x^2\right)$

Watch Video Solution

79. Show that the following functions are continuous:

$f(x) = |\cos x|$

Watch Video Solution

80. Show that the function 'f' given by:

$f(x) = |x| + |x - 1|, x \in R$ is continuous both at x = 0 and x=1

Watch Video Solution

81. Show that the function 'f' given by:

$f(x) = |x - 1| + |x - 2|, x \in R$ is continuous both at x =1 and x=2

Watch Video Solution

82. Locate the points of discontinuity of the function:

$$f(x) = \begin{cases} \dfrac{x^4 - 16}{x - 2} & \text{if } x \neq 2 \\ 16 & \text{if } x = 2 \end{cases}$$

Watch Video Solution

83. Examine the derivability of the following functions at the specified points:

$|x|$ at x=0

Watch Video Solution

84. Examine the derivability of the following functions at the specified points:

[x] at x=1

Watch Video Solution

85. Examine the derivability of the following functions at the specified points:

$|x|^2 atx = 0$

Watch Video Solution

86. Examine the derivability of the following functions at the specified points:

$x^3 atx = 2$

Watch Video Solution

Watch Video Solution

87. If 'f' is differentiable at x = a, find $\left(\lim_{x \to a} \frac{x^2 f(a) - a^2 f(x)}{x - a}\right)$

Watch Video Solution

88. If F(x) = f(Ax) and f(ax) is differentiable , then prove that F'(x) = af' (ax), $a \neq 0$

Watch Video Solution

89. If $f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ Show that 'f' is not differentiable at x =0

Watch Video Solution

90. Show that the function defined by:

$$f(x):\begin{cases} 3 - 2x & \text{if} \quad x < 2 \\ 3x - 7 & \text{if} \quad x \geq 2 \end{cases}$$ is not derivable at x =2.

Watch Video Solution

91. Discuss the continuity of fx) at x =0, when:

$$f(x) = \begin{cases} \dfrac{e^{1/x} - 1}{e^{1/x} + 1} & x \neq 0 \\ 0 & x = 0 \end{cases}$$

Watch Video Solution

92. Show that the function:

$$f(x) = \begin{cases} 2 + x & \text{if} \quad x \geq 0 \\ 2 - x & \text{if} \quad x < 0 \end{cases}$$ is continuous but not derivable at x=0

Watch Video Solution

Watch Video Solution

93. Show that the function 'f' defined as follows, is continuous at x = 2, but not differentiable there at:

$$f(x) = \begin{cases} 3x - 2 & 0 < x \leq 1 \\ 2x^2 - x & 1 < x \leq 2 \\ 5x - 4 & x > 2 \end{cases}$$

Watch Video Solution

94. The function 'f' defined as:

$$f(x) = \begin{cases} x^2 + 3x + a & \text{if } x \leq 1 \\ bx + 2 & \text{if } x > 1 \end{cases}$$ is derivable for every x, Find the values of 'a' and 'b'.

Watch Video Solution

95. For what values of 'a' and 'b' the function:

$f(x) = \begin{cases} x^2 & x \leq c \\ ax + b & x > c \end{cases}$ is differentiable at x =c.

Watch Video Solution

96. Let $f: R \rightarrow R$(R is the set of real numbers) be defined as follows:

$f(x) = \left\{ : (2 - x, \quad \text{if} \quad 1 \leq x \leq 2), \left(x - \frac{1}{2}x^2, \quad \text{if} \quad x \geq 2 \right) \right.$: Examine the continity and differentiability of f(x) at x=2.

Watch Video Solution

97. Show that f(x) = |x-3|, x in R` is continuous but not differentiable at x =3.

Watch Video Solution

98. Write an example of a function, which is continuous everywhere but fails to be differentiable at exactly five points.

Watch Video Solution

99. Use Chain Rule to find the derivatives of the following:

$f(x) = (1 - 2x)^2$

Watch Video Solution

100. Find the derivatives of the following:

$f(x) = \left(x^2 + 3x + 4\right).$

Watch Video Solution

101. Use Chain Rule to find the derivatives of the following:

$$f(x) = \left(3x^2 + 2\right)^3(5x - 1)^2$$

Watch Video Solution

102. Use Chain Rule to find the derivatives of the following:

$$f(x) = \left(2x^2 + 3\right)^{\frac{5}{3}}(x + 5)^{-\frac{1}{3}}$$

Watch Video Solution

103. Use Chain Rule to find the derivatives of the following:

$$f(x) = \frac{3}{2 - x}, x \neq 2$$

Watch Video Solution

104. Find the derivatives of the following:

$h(x) = (x + 1)(x + 2)(x + 3)$

Watch Video Solution

105. Use Chain Rule to find $\frac{dy}{dx}$, if $y = \left(\frac{3x - 1}{(3x + 1)^2}\right)$

Watch Video Solution

106. Find $\frac{dy}{dx}$, if $y = \left(4x^3 - 5x^2 + 1\right)$

Watch Video Solution

107. Find $\frac{dy}{dx}$, if $y = 1 - 2\left(\frac{5x}{3x + 2}\right)^2 + \left(\frac{5x}{3x + 2}\right)^3$

Watch Video Solution

108. Differentiate the following w.r.t. x:

$\sin\left(x^2\right)$

Watch Video Solution

109. Differentiate the following w.r.t. x:

$\sin\left(x^2+5\right)$

Watch Video Solution

110. Differentiate the following w.r.t. x:

tan(3x+5)

Watch Video Solution

111. Differentiate the following w.r.t. x:

$\sin x^0$

Watch Video Solution

112. Differentiate the following w.r.t. x:

$\sin^4(ax+b)^2$

Watch Video Solution

113. Differentiate the following w.r.t. x:

sin(cotx)

Watch Video Solution

114. Differentiate the following w.r.t. x:

$\sin^2\left(x^5\right)$

Watch Video Solution

115. Differentiate the following w.r.t. x:

$\cos^2\left(x^3\right)$

Watch Video Solution

116. Differentiate the following w.r.t. x:

$\cos x^3 . \sin^2\left(x^5\right)$

Watch Video Solution

117. Differentiate the following w.r.t. x:

$$2^{\sqrt{\cot\left(x^2\right)}}$$

Watch Video Solution

118. Differentiate the following w.r.t. x:

$$\sqrt{3x+2}+\frac{1}{\sqrt{2x^2+4}}$$

Watch Video Solution

119. Differentiate the following w.r.t. x:

$$\sqrt{10x^2+x+1}$$

Watch Video Solution

120. Differentiate the following w.r.t. x:

$$\frac{\sin(ax - b)}{\cos(cx - d)}$$

Watch Video Solution

121. Cos(a cos x + b sin x), for some constants 'a' and 'b'.

Watch Video Solution

122. If $y = \sin\left(ax^2 + bx + c\right)$, then find $\frac{dy}{dx}$

Watch Video Solution

123. Find $\frac{dy}{dx}$ if :

$$y = 9u^2, u = 1 - \frac{3}{2}x^2$$

Watch Video Solution

124. Find $\frac{dy}{dx}$ if :

$$y = \frac{3 - v}{2 + v}, v = \frac{4x}{1 - x^2}$$

Watch Video Solution

125. Find $\frac{dy}{dx}$ if :

$$y = at^2, t = \frac{x}{2a}$$

Watch Video Solution

126. If $x^{16}. y^9 = \left(x^2 + y\right)^{17}$, prove that $\frac{dy}{dx} = \frac{2y}{x}$.

Watch Video Solution

127. Differentiate the following w.r.t. x:

$|2x-1|$

Watch Video Solution

128. Differentiate the following w.r.t. x:

$\left|2x^2 - 3\right|$

Watch Video Solution

129. If y + sin y = cosx, then find the values of 'y' for which $\frac{dy}{dx}$ is valid.

Watch Video Solution

130. Find the derivative of y w.r.t x in each of the following:

$x - y = \pi$

Watch Video Solution

131. Find the derivative of y w.r.t x in each of the following:

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2003$$

Watch Video Solution

132. Find the derivative of y w.r.t x in each of the following:

$x^3 + x^2y + xy^2 + y^3 = 81$

Watch Video Solution

133. Find the derivative of y w.r.t x in each of the following:

$x^3 + 2x^2y + 3xy^2 + 4y^3 = 5$

Watch Video Solution

134. Find the derivative of y w.r.t x in each of the following:

2x+3y=sinx

Watch Video Solution

135. Find the derivative of y w.r.t x in each of the following:

2x+3y= siny.

Watch Video Solution

136. Find the derivative of y w.r.t x in each of the following:

$ax + by^2 = \cos y$

Watch Video Solution

137. Find the derivative of y w.r.t x in each of the following:

$xy + y^2 = \tan x + y$

Watch Video Solution

138. Find the derivative of y w.r.t x in each of the following:

$\sin^2 y + \cos xy = \pi$

Watch Video Solution

139. Find the derivative of y w.r.t x in each of the following:

$$\frac{1}{x} - \frac{1}{y} - 10 = 0$$

Watch Video Solution

140. Find the derivative of y w.r.t x in each of the following:

$$\sqrt{x} + \sqrt{y} = 20$$

Watch Video Solution

141. Find the derivative of y w.r.t x in each of the following:

$y(y+1)=x(x+1)(x+2)$

Watch Video Solution

142. Find the derivative of y w.r.t x in each of the following:

$$x^2 = \frac{x + 3y}{x - 3y}$$

Watch Video Solution

143. Find the derivative of y w.r.t x in each of the following:

$$\frac{y}{x + y} = 3 + x^3$$

Watch Video Solution

144. Find the derivative of y w.r.t x in each of the following:

$$y^2 = 4ax$$

Watch Video Solution

145. Find the derivative of y w.r.t x in each of the following:

$$y = \frac{4}{3}x^{3/4}$$

Watch Video Solution

146. Find the derivative of f(x) w.r.t x in the following:

$$f(x) = \sqrt[3]{2x^4 + x^2 - x}$$

Watch Video Solution

147. Find the derivative of f(x) w.r.t x in the following:

$$f(x) = \sqrt[3]{ax + b}$$

Watch Video Solution

148. Find the derivative of f(x) w.r.t x in the following:

$$f(x) = \left(x^2 + x + 5\right)^{1/3}\left(x^3 + 1\right)^{2/3}$$

Watch Video Solution

149. Find the derivative of f(x) w.r.t x in the following:

$$g(x) = \sqrt[3]{5x - 9}\sqrt[3]{3x - 4}$$

Watch Video Solution

150. Obtain $\frac{dy}{dx}$ when:

$$x^2 + y^2 + 2axy = 0$$

Watch Video Solution

151. Obtain $\frac{dy}{dx}$ when:

$x^3 + y^3 + 3axy = 0$

Watch Video Solution

152. Obtain $\frac{dy}{dx}$ when:

$x^2 + y^2 + 2gx + 2fy + c = 0$

Watch Video Solution

153. Obtain $\frac{dy}{dx}$ when:

$x^4 + y^4 + 4xy - 100 = 0$

Watch Video Solution

154. If $x\sqrt{1+y}+y\sqrt{1+x}=0$ for x lies between -1 and 1` prove that

dy/dx =-1/(1+x)^2

Watch Video Solution

155. If $y=\sqrt{x}+\frac{1}{\sqrt{x}}$, then show that $2x\frac{dy}{dx}$+y = 2√ x

Watch Video Solution

156. Find $\frac{dy}{dx}$ for each of the following:

$y=\left(x^2+3x+5\right)\left(x^2-2\right)^2$

Watch Video Solution

157. Find $\frac{dy}{dx}$ for each of the following:

$$y = \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)\left(1 + x + x^2\right)$$

Watch Video Solution

158. Find $\frac{dy}{dx}$ for each of the following:

$$y = \left(\frac{x - \sqrt{x}}{1 - 2x}\right)^2$$

Watch Video Solution

159. Find $\frac{dy}{dx}$ for each of the following:

$$y = \left(\frac{1}{1 + x}\right)\left(x^{-2} + \frac{2}{x} - 1\right) + \sqrt[3]{x} - \frac{1}{\sqrt[3]{x}}$$

Watch Video Solution

160. Find $\frac{dy}{dx}$ for each of the following:

$$y = \sqrt[3]{x^2\left(x^2 + 3\right)}$$

Watch Video Solution

161. If $\cos y = x\cos(a + y)$, with $\cos a \neq \pm 1$, prove that $\frac{dy}{dx} = \frac{\cos^2(a + y)}{\sin a}$

Watch Video Solution

162. If sin y = x sin (a+y), then show that: $\frac{dy}{dx} = \frac{\sin a}{1 - 2x\cos a + x^2}$

Watch Video Solution

163. Differentiate the following w.r.t. x:

$\tan^{-1}\sqrt{x}$

Watch Video Solution

164. Differentiate the following w.r.t. x:

$\cos^{-1}\left(\frac{x}{x+1}\right)$

Watch Video Solution

165. Differentiate the following w.r.t. x:

$\sin^{-1}\left(x\sqrt{x}\right), 0 \le x \le 1$

Watch Video Solution

166. Differentiate the following w.r.t. x:

$\left(\tan^{-1}x\right)^2$

Watch Video Solution

167. Differentiate the following w.r.t. x:

$x\sec^{-1}x$

Watch Video Solution

168. Differentiate the following w.r.t.x.

$\cos^{-1}(\sin x)$

Watch Video Solution

169. Differentiate the following w.r.t. x:

$$\tan\left(\sin^{-1}x\right)$$

Watch Video Solution

170. Differentiate the following w.r.t. x:

$$\sin^{-1}(2x)$$

Watch Video Solution

171. Differentiate the following w.r.t. x:

$$\left(\cot^{-1}x\right)^2$$

Watch Video Solution

172. Differentiate the following w.r.t. x:

$$\sin\left(2\sin^{-1}x\right)$$

Watch Video Solution

173. Differentiate the following w.r.t. x:

$$x\tan^{-1}x$$

Watch Video Solution

174. Differentiate the following w.r.t. x:

$$\tan^{-1}\left(\frac{\sin x}{1+\cos x}\right)$$

Watch Video Solution

175. Differentiate the following w.r.t. x:

$$\tan^{-1}\left(\frac{\cos x}{1 + \sin x}\right)$$

Watch Video Solution

176. Differentiate the following w.r.t. x:

$$\cot^{-1}\left(\frac{1 + \cos x}{\sin x}\right)$$

Watch Video Solution

177. Differentiate the following w.r.t. x:

$$\sin^{-1}\left(1 - 2x^2\right)$$

Watch Video Solution

178. Differentiate the following w.r.t. x:

$$\sin^{-1}\left(3x - 4x^3\right), \ -\frac{1}{2} < x < \frac{1}{2}$$

Watch Video Solution

179. Differentiate the following w.r.t.x.

$$\cos^{-1}\left(4x^3 - 3x\right)$$

Watch Video Solution

180. Differentiate the following w.r.t. x:

$$\sin^{-1}\left(\frac{2x}{1 + x^2}\right), \ -1 < x < 1$$

Watch Video Solution

181. Differentiate the following w.r.t.x.

$$\mathrm{cosec}^{-1}\frac{1+x^2}{2x}$$

Watch Video Solution

182. Differentiate the following w.r.t. x:

$$\sin^{-1}\left(\frac{1-x^2}{1+x^2}\right), 0 < x < 1$$

Watch Video Solution

183. Differentiate the following w.r.t. x:

$$\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right), 0 < x < 1$$

Watch Video Solution

184. Differentiate the following w.r.t. x:

$$\cos^{-1}\left(2\frac{x}{1+x^2}\right), \ -1 < x < 1$$

Watch Video Solution

185. Differentiate the following w.r.t. x:

$$\tan^{-1}\left(2\frac{x}{1-x^2}\right), 0 < x < 1$$

Watch Video Solution

186. Differentiate the following w.r.t. x:

$$\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right), \ -\frac{1}{\sqrt{3}} < x < \frac{1}{\sqrt{3}}$$

Watch Video Solution

187. Differentiate the following w.r.t. x: $\tan^{-1}\left(\frac{x^{1/3}+A^{1/3}}{1-x^{1/3}a^{1/3}}\right)$

Watch Video Solution

188. Differentiate the following w.r.t.x.

$\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)$

Watch Video Solution

189. Differentiate the following w.r.t. x , $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$

Watch Video Solution

190. Differentiate the following w.r.t. x , $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$

Watch Video Solution

191. Differentiate the following w.r.t. x:

$\cot^{-1}\left(\frac{1+x}{1-x}\right)$

Watch Video Solution

192. Differentiate the following w.r.t. x:

$\cot^{-1}\left(\sqrt{1+x^2}+x\right)$

Watch Video Solution

193. Differentiate the following w.r.t.x.

$\tan^{-1}(\sec x + \tan x)$

Watch Video Solution

194. Differentiate the following w.r.t. x:

$\tan^{-1}\sqrt{\frac{1 - \cos x}{1 + \cos x}}$

Watch Video Solution

195. Differentiate the following w.r.t. x: $\tan^{-1}\sqrt{\frac{1 + \sin x}{1 - \sin x}}$

Watch Video Solution

196. Differentiate the following w.r.t. x:

$\sin^{-1}x + \sin^{-1}\sqrt{1 - x^2}, \ -1 \leq x \leq 1$

Watch Video Solution

197. Differentiate the following w.r.t. x:

$$\sin^{-1}\left(\sqrt{\frac{1 + x^2}{2}}\right)$$

Watch Video Solution

198. If $y = \cot^{-1}\left\{\frac{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}}\right\}$ $0 < x < \frac{\pi}{2}$, show that:

$\frac{dy}{dx}$ is independent of x.

Watch Video Solution

199. Differentiate w.r.t x : $\cot^{-1}\left\{\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right\}, 0 < \theta < \frac{\pi}{2}$

Watch Video Solution

200. If $y = \tan^{-1}\left(\frac{5ax}{a^2 - 6x^2}\right)$. Prove that $\frac{dy}{dx} = \frac{3a}{a^2 + 9x^2} + \frac{2a}{a^2 + 4x^2}$

Watch Video Solution

201. If $y = \frac{\tan^{-1}(4x)}{1 + 5x^2} + \frac{\tan^{-1}(2 + 3x)}{3 - 2x}$, prove that $\frac{dy}{dx} = \frac{5}{1 + 25x^2}$

Watch Video Solution

202. If $f(x) = \tan^{-1}x, g(x) = \tan^{-1}\left(\frac{1 + x}{1 - x}\right)$ fo |x| < 1, show that f' (x) = g' (x) and g(x) - f(x) = pi/4`

Watch Video Solution

203. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a^3\left(x^3-y^3\right)$, prove that : $\frac{dy}{dx}=\frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$.

Watch Video Solution

204. If $y=\tan^{-1}(\cot x)+\cot^{-1}(\tan x)$, then prove that : $\frac{dy}{dx}+2=0$

Watch Video Solution

205. Differentiate : $\cos(2x+3)$

Watch Video Solution

206. Differentiate: $\cos x^2$

Watch Video Solution

207. Differentiate the following w.r.t. x: e^{-x}

Watch Video Solution

208. Differentiate the following w.r.tx:

$e^{\cot^{-1} x^2}$

Watch Video Solution

209. Differentiate the following w.r.tx:

$e^{m \log x}$

Watch Video Solution

Watch Video Solution

210. Differentiate the following w.r.tx:

$\sqrt{e^{\sqrt{x}}}$, x > 0

Watch Video Solution

211. Differentiate the following w.r.t x

log(logx) , x > 1

Watch Video Solution

212. Differentiate the following w.r.tx:

log (sinx)

Watch Video Solution

213. Differentiate the following w.r.t. x: $\log\left(\cos e^{x}\right)$

Watch Video Solution

214. Differentiate the following w.r.t. x: $\sin\left(\tan^{-1}e^{-x}\right)$

Watch Video Solution

215. Differentiate the following w.r.tx:

$\frac{\cos x}{\log x}, x > 0$

Watch Video Solution

216. Differentiate the following w.r.tx:

$\sqrt{\tan x^{0}}\alpha^{x}$

Watch Video Solution

217. Differentiate the following w.r.t. x: $e^{\cos x}$

Watch Video Solution

218. Differentiate the following w.r.tx:

$e^x \sin x$

Watch Video Solution

219. Differentiate the following w.r.tx:

$x^{-1/3} e^x$

Watch Video Solution

220. Differentiate the following w.r.tx:

$x \sin x e^{x}$

Watch Video Solution

221. Differentiate the following w.r.tx:

$e^{\sin^{-1}(x+1)}$

Watch Video Solution

222. Differentiate the following w.r.tx:

tan{log(sinx)}

Watch Video Solution

223. Differentiate the following w.r.tx:

$e^{\sin\sqrt{x}}$

Watch Video Solution

224. Differentiate the following w.r.tx:

$e^{\cos^{-1}(x+1)}$

Watch Video Solution

225. Differentiate the following w.r.tx:

$e^{\cos^{-1}x^2}$

Watch Video Solution

226. Differentiate the following w.r.tx:

$\sqrt{1 - x^2}.\, e^{5x}$

Watch Video Solution

227. Differentiate the following w.r.tx:

$e^{\sqrt{1 - x^2}}.\, \tan x$

Watch Video Solution

228. Differentiate the following w.r.tx:

$\frac{\log x}{x}$

Watch Video Solution

229. Differentiate the following w.r.tx:

$$\frac{e^x}{x}$$

Watch Video Solution

230. Differentiate the following w.r.tx:

$$\frac{\log x}{e^x}$$

Watch Video Solution

231. Differentiate the following w.r.tx:

log(cos5x)

Watch Video Solution

232. Differentiate the following w.r.tx:

$$\frac{1}{\log\cos x}$$

Watch Video Solution

233. Differentiate the following w.r.tx:

$$\left(x^2 + 7x + 2\right)\left(e^x - \sin x\right)$$

Watch Video Solution

234. Differentiate the following w.r.tx:

$$e^{-3x}\sin^2 3x$$

Watch Video Solution

235. Differentiate the following w.r.tx:

$$e^{-x^2}\sin(\log x)$$

Watch Video Solution

236. Differentiate the following w.r.tx:

$$\tan^{-1}\left(\frac{e^{2x}+1}{e^{2x}-1}\right)$$

Watch Video Solution

237. Differentiate the following w.r.tx:

$$\log\left((x+3)+\sqrt{x^2+6x+3}\right)$$

Watch Video Solution

238. Differentiate the following w.r.t.x. $\log\left(x+\sqrt{a^2+x^2}\right)$

Watch Video Solution

239. Differentiate the following w.r.tx:

$$x\sqrt{x^2+1}+\log\left(x+\sqrt{x^2+1}\right)$$

Watch Video Solution

240. Differentiate the following w.r.tx:

$$\frac{e^x(x-1)}{\left(x^2+1\right)}$$

Watch Video Solution

241. Differentiate the following w.r.tx:

$$\frac{e^{ax}}{\sin(bx + c)}$$

Watch Video Solution

242. Differentiate the following w.r.tx:

$$\frac{1}{3}e^{x} - 5e$$

Watch Video Solution

243. Differentiate the following w.r.tx:

$$e^{x} + 2\cos x$$

Watch Video Solution

244. Differentiate the following w.r.t. x:

$x^2e^x\sin x$

Watch Video Solution

245. Differentiate the following w.r.tx:

$e^{\sec^2 x} + 3\cos^{-1}x$

Watch Video Solution

246. Differentiate the following w.r.tx:

$\log\left(\sin\sqrt{1+x^2}\right)$

Watch Video Solution

247. Differentiate the following w.r.t. x: $\sin(\log x), x > 0$

Watch Video Solution

248. Differentiate the following w.r.tx:

log(cos5x)

Watch Video Solution

249. Differentiate the following w.r.tx:

$\cot\left(\log x + e^{\sqrt{x}}\right)$

Watch Video Solution

250. Differentiate the following w.r.tx:

$$2l_n\left(\frac{x - 1}{x + 1}\right)$$

Watch Video Solution

251. Differentiate the following w.r.tx:

$$x^2 l_n\left(\left(\sqrt{\frac{x^2 + 9}{x^2 + 4}}\right)\right)$$

Watch Video Solution

252. Differentiate the following w.r.tx:

$$l_n(\sec x + \tan x)$$

Watch Video Solution

253. Differentiate the following w.r.tx:

$$\log\left(\frac{1+x}{1-x}\right)$$

Watch Video Solution

254. Differentiate the following w.r.t.x.

$$\log\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)$$

Watch Video Solution

255. Differentiate the following w.r.t.x.

$$\sin^{-1}\left(2x\sqrt{1-x^2}\right)$$

Watch Video Solution

256. Find $\frac{dy}{dx}$ if $y = x^x$

Watch Video Solution

257. Find $\frac{dy}{dx}$ when:

$xy + ce^{-y} + ye^x = x^2$

Watch Video Solution

258. If $\frac{1}{2}\left(e^y - e^{-y}\right) = x, provet\hat{:} \frac{dy}{dx} = \frac{1}{\sqrt{1 + x^2}}$

Watch Video Solution

259. If $xy = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{y(x-1)}{x(y+1)}$

Watch Video Solution

260. If $y = \frac{\sin^{-1}x}{\sqrt{1 - x^2}}$, prove that $\left(1 - x^2\right)\left(\frac{dy}{dx}\right) - xy = 1$

Watch Video Solution

261. If $x = \tan\left(\frac{1}{2}\log y\right)$, then show that $\left(1 + x^2\right)\frac{d^2y}{dx^2} = (a - 2x)\frac{dy}{dx}$.

Watch Video Solution

262. Differentiate $\tan^{-1}\left(\frac{2^{x+1}}{1 - 4^x}\right)$ with respect to x.

Watch Video Solution

263. If $y = \log_{10}\sin x$, prove that $\frac{dy}{dx} = \left(\log_{10}e\right)\cot x$

Watch Video Solution

264. If $y = \sin[\sin(\log 3x)]$. $F \in d$dy/dx`

Watch Video Solution

265. Find, from first principle , the derivative of the following w.r.t. x:

e^2x

Watch Video Solution

266. Find, from first principle , the derivative of the following w.r.t. x:

$e^{\sqrt{x}}$

Watch Video Solution

267. Differentiate the following w.r.t. x: e^{-x}

Watch Video Solution

268. Find, from first principle , the derivative of the following w.r.t. x:

$e^{\sin x}$

Watch Video Solution

269. Find, from first principle , the derivative of the following w.r.t. x:

$e^{\sqrt{\tan x}}$

Watch Video Solution

270. Find, from first principle , the derivative of the following w.r.t. x:

log (sinx)

Watch Video Solution

271. Find, from first principle , the derivative of the following w.r.t. x:

log(cosx)

Watch Video Solution

272. Find, from first principle , the derivative of the following w.r.t. x:

$\log x^2$

Watch Video Solution

273. Find, from first principle , the derivative of the following w.r.t. x:

cos (logx), where x > 0

Watch Video Solution

274. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = 2at^2, y = at^4$

Watch Video Solution

275. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$$x = 4t, y = \frac{4}{t}$$

Watch Video Solution

276. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$$x = -\frac{2t}{1+t^2}, y = \frac{1-t^2}{1+t^2}$$

Watch Video Solution

277. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$$x = \frac{1 - t^2}{1 + t^2}, y = \frac{2t}{1 + t^2}$$

Watch Video Solution

278. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$$x = \frac{a\left(1 + t^2\right)}{1 - t^2}, y = \frac{2t}{1 - t^2}$$

Watch Video Solution

279. If x and y are connected parametrically by the equations given in Exercises 1 to 10, without eliminating the parameter, Find $\frac{dy}{dx}$:

$x = \sin t, y = \cos 2t$

Watch Video Solution

280. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

x = log t, y = sin t

Watch Video Solution

281. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = e^t \cos t, y = e^t \sin t. at t = \frac{\pi}{2}$

Watch Video Solution

282. Find $\frac{dy}{dx}$ in the following

$x = a\cos\theta, y = a\sin\theta.$

Watch Video Solution

283. If x and y are connected parameterically by the equation , without eliminating the parameter , find $\frac{dy}{dx}$

$x = a\cos(\theta), y = b\sin(\theta)$

Watch Video Solution

284. If x and y are connected parameterically by the equation , without eliminating the parameter , find $\frac{dy}{dx}$

$x = a\cos(\theta), y = b\sin(\theta)$

Watch Video Solution

285. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a\cos^2\theta, y = b\sin^2\theta$

Watch Video Solution

286. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = 2\cos^2\theta, y = 2\sin^2\theta$

Watch Video Solution

287. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = 2\cos^3\theta, y = 2\sin^3\theta$

Watch Video Solution

288. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = 3\cos^3\theta, y = 3\sin^3\theta$

Watch Video Solution

289. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = c\tan\theta, y = c\cot\theta$

Watch Video Solution

290. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$

Watch Video Solution

291. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$

Watch Video Solution

292. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$

Watch Video Solution

293. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$y = a(\theta + \sin\theta), x = a(1 + \cos\theta)$

Watch Video Solution

Watch Video Solution

294. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$

Watch Video Solution

295. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x\cos\theta - \cos2\theta, y = \sin\theta - \sin2\theta$

Watch Video Solution

296. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a(\cos\theta - \cos2\theta), y = a(\sin\theta - \sin2\theta)$

Watch Video Solution

297. If x and y are connected parametrically by the equations given in Exercises 1 to 10, without eliminating the parameter, Find $\frac{dy}{dx}$:

$x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$

Watch Video Solution

298. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = \cos2\theta + 2\cos\theta, y = \sin2\theta - 2\sin\theta$

Watch Video Solution

299. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$x = a\sin\theta, y = a\left(\cos\theta + \log\tan\left(\frac{\theta}{2}\right)\right)$

Watch Video Solution

300. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations, given below without eliminating the parameter.

$y = 12(1 - \cos t), x = 10(t - \sin t), \ -\frac{\pi}{2} < t < \frac{\pi}{2}$

Watch Video Solution

301. If $x = 2\cos\theta - \cos 2\theta, y = 2\sin\theta - \sin 2\theta$, find $\frac{dy}{dx} at\theta = \frac{\pi}{2}$

Watch Video Solution

302. If $x = a\left(\cos\theta + \log\tan\left(\frac{\theta}{2}\right)\right), y = a\sin\theta$ find $\frac{dy}{dx} at \theta = \frac{\pi}{3}$

Watch Video Solution

303. If $x = ct, y = \frac{c}{t}$, find $\frac{dy}{dx} at t = 2$

Watch Video Solution

304. Find $\frac{dy}{dx}, where$x=t^3 + 1/t and y = (t+t^2)^3`

Watch Video Solution

305. For a positive constant a find $\frac{dy}{dx}$,where $y = a^{t+\left(\frac{1}{t}\right)}$, and $x = \left(t + \frac{1}{t}\right)^{a}$

Watch Video Solution

Watch Video Solution

306. If $(x = a\sin(2t)(1 + \cos(2t))$ and $(y = b\cos(2t)(1 - \cos(2t))$, then show that $\left(\left(\frac{dy}{dx}\right)_{t=\frac{\pi}{4}} = \frac{b}{a}\right)$.

Watch Video Solution

307. If $x = \frac{1 + \log t}{t^2}, y = \frac{3 + 2\log t}{t}, t > 0$, prove that $y\left(\frac{dy}{dx}\right) - 2x\left(\frac{dy}{dx}\right)^2 = 1$

Watch Video Solution

308. Find $\frac{dy}{dx}$ in the following

$x = e^{\theta}(\sin\theta + \cos\theta), y = e^{\theta}(\sin\theta - \cos\theta)$

Watch Video Solution

309. Differentiate the following w.r.t. x:

$$\left(\sqrt{x}\right)^{\sqrt{x}}$$

Watch Video Solution

310. Differentiate the following w.r.t. x:

$$\left(\frac{1}{x}\right)^{x}$$

Watch Video Solution

311. Differentiate the following w.r.t. x:

$$\left(x^{x}\right)^{x}$$

Watch Video Solution

312. Differentiate the following w.r.t. x:

x^{x^2}

Watch Video Solution

313. Differentiate the following w.r.t. x:

$(5x)^{3\cos 2x}$

Watch Video Solution

314. Differentiate the following w.r.t. x:

$x^{\sin x}, x > 0$

Watch Video Solution

315. Differentiate the following w.r.t. x:

$(\sin x)^{x}$

Watch Video Solution

316. Differentiate the following w.r.t. x:

$x^{\sin^{-1}}$

Watch Video Solution

317. Differentiate the following w.r.t. x:

$x^{x}\sin\sqrt{x}$

Watch Video Solution

318. Differentiate the following w.r.t. x:

$(\sin x)^{\log x}, \sin x > 0$

Watch Video Solution

319. Differentiate the following w.r.t. x:

$(\sin x)^{\tan x}$

Watch Video Solution

320. Differentiate the following w.r.t. x:

$(\sin x)^{\sin x}$

Watch Video Solution

321. Differentiate the following w.r.t. x:

$$\left(\sec^2 x\right)^{1/x}$$

Watch Video Solution

322. Differentiate the following w.r.t. x:

$$(x\cos x)^x$$

Watch Video Solution

323. Differentiate the following w.r.t. x:

$$(x)^{\log x}$$

Watch Video Solution

324. Differentiate the following w.r.t. x:

$(\log x)^{\log x}, x > 1$

Watch Video Solution

325. Differentiate the following w.r.t. x:

$x^{\sin 2x + \cos 2x}$

Watch Video Solution

326. Differentiate the following w.r.t. x:

$x^{\sin x + \cos x}$

Watch Video Solution

327. Differentiate the following w.r.t. x:

$(\log x)^x$

Watch Video Solution

328. Differentiate the following w.r.t. x:

$\left(\sin^{-1}x\right)^x$

Watch Video Solution

329. Differentiate the following w.r.t. x:

$\left(\tan^{-1}x\right)^x$

Watch Video Solution

330. Differentiate the following w.r.t. x:

$x^{\cos^{-1}x}$

Watch Video Solution

331. Differentiate the following w.r.t. x:

$(\sin x)^{\cos^{-1}x}$

Watch Video Solution

332. Differentiate the following w.r.t. x:

$(\sin x - \cos x)^{\sin x - \cos x}, \frac{\pi}{4} < x < \frac{3\pi}{4}$

Watch Video Solution

333. Differentiate the following w.r.t. x:

$\cos\left(x^{x}\right)$

Watch Video Solution

334. Differentiate the following w.r.t. x:

$(1+x)^{\log x}$

Watch Video Solution

335. Differentiate the following w.r.t x

$(\log x)^{\cos x}$

Watch Video Solution

336. Differentiate the following w.r.t. x:

$x^{\sin x} + (\sin x)^x$

Watch Video Solution

337. Differentiate the following w.r.t. x:

$(x)^{\log x} + (\log x)^x$

Watch Video Solution

338. Differentiate the following w.r.t.x.

$x^{\tan x} + (\tan x)^x$.

Watch Video Solution

339. Differentiate the following w.r.t. x:

$x^{\cot x} + (\cos x)^{\sin x}$

Watch Video Solution

340. Differentiate the following w.r.t. x:

$x^{\cos x} + (\cos x)^{x}$

Watch Video Solution

341. Differentiate the following w.r.t. x:

$x^{\cos x} + (\sin x)^{\tan x}$

Watch Video Solution

342. Differentiate the following w.r.t. x:

$(\sin x)^{\cos x} + (\cos x)^{\sin x}$

Watch Video Solution

343. Differentiate the following w.r.t. x:

$(\sin x)^{\tan x} + (\cos x)^{\sec x}$

Watch Video Solution

344. Differentiate the following w.r.t. x:

$(\log x)^{x} + (x)^{\cos x}$

Watch Video Solution

345. Differentiate the following w.r.t. x:

$(x)^{\sin x} + (\log x)^{x}$

Watch Video Solution

346. Differentiate the following w.r.t. x:

$(x)^{x} + (\sin x)^{x}$

Watch Video Solution

347. Differentiate the following w.r.t. x:

$(x)^{\sin x} + (\cos x)^{x}$

Watch Video Solution

348. Differentiate the following w.r.t. x:

$x^{\sin x} + (\sin x)^{\cos x}$

Watch Video Solution

349. Differentiate the following w.r.t. x:

$(\sin x)^{\sec x} + (\tan x)^{\cos x}$

Watch Video Solution

350. Differentiate the following w.r.t. x:

$(\tan x)^{\cot x} + x^{\tan x}, 0 < x < \frac{\pi}{4}$

Watch Video Solution

351. Differentiate the following w.r.t. x:

$(x)^{\cos x} + (\cos x)^{\sin x}$

Watch Video Solution

352. Differentiate the following w.r.t. x:

$x^{\sin x} + (\sin x)^{\cos x}$

Watch Video Solution

353. Differentiate the following w.r.t. x:

$(\sin x)^{\sec x} + (\tan x)^{\cos x}$

Watch Video Solution

354. Differentiate the following w.r.t. x:

$(\tan x)^{\cot x} + x(\tan x),\ 0 < x < \frac{\pi}{4}$

Watch Video Solution

355. Differentiate the following w.r.t. x:

$x^{\sin x} + (\sin x)^{\cos x}$

Watch Video Solution

356. Differentiate the following w.r.t. x:

$(\sin x)^{x} + \sin^{-1}\sqrt{x}$

Watch Video Solution

357. Differentiate the following w.r.t. x:

$(x)^{\log x} + (\log x)^{x}$

Watch Video Solution

358. Differentiate the following w.r.t. x:

$(\log x)^{\cos x} + \dfrac{x^2 + 1}{x^2 - 1}$

Watch Video Solution

359. Differentiate the following w.r.t. x:

$(x\cos x)^{x} + (x\sin x)^{1/x}$

Watch Video Solution

360. Differentiate the following w.r.t. x:

$(\cos x)^{x} + (\sin x)^{1/x}$

Watch Video Solution

361. Differentiate the following w.r.t. x:

$e^{\sin x} + (\tan x)^{x}$

Watch Video Solution

362. Differentiate the following w.r.t. x:

$x^{x} - 2^{\sin x}$

Watch Video Solution

363. Differentiate the following w.r.t. x:

$$\left(x+\frac{1}{2}\right)^{x}+x^{1+\frac{1}{x}}$$

Watch Video Solution

364. Differentiate the following w.r.t. x:

$$x^{x^2-3}+(x-3)^{x^2}, f \text{ or } x>3$$

Watch Video Solution

365. Differentiate the following w.r.t. x:

$$x^2+(\sin x)^x$$

Watch Video Solution

366. Differentiate the following w.r.t. x:

$$\frac{(ax+b)(cx+d)}{(ax-b)(cx-d)}, x \neq \frac{b}{a}, \frac{d}{c}$$

Watch Video Solution

367. Differentiate the following w.r.t. x:

$$\frac{\frac{\cos^{-1}x}{2}}{\sqrt{2x+7}}, \ -2 < x < 2$$

Watch Video Solution

368. Differentiate the following w.r.t.x .

$$\frac{\sqrt{(x-3)\left(x^2+4\right)}}{3x^2+4x+5}$$

Watch Video Solution

369. Differentiate the following w.r.t. x:

$x^2 e^x \sin x$

Watch Video Solution

370. Differentiate the following w.r.t. x:

$e^x \cos^3 x \sin^2 x$

Watch Video Solution

371. Differentiate the following w.r.t. x:

$(x+6)^3 (x+2)^4 (x+5)^5$

Watch Video Solution

372. Differentiate the following w.r.t. x:

$\sqrt{(x-1)(x-2)(x-3)(x-4)}$

Watch Video Solution

373. If $xy = e^{x-y}$, find $\frac{dy}{dx}$

Watch Video Solution

374. If $(\sin x)^{Y} = (\sin y)^{x}$, find $\frac{dy}{dx}$:

Watch Video Solution

375. If $(\cos x)^{y} = (\cos y)^{x}$, find $\frac{dy}{dx}$.

Watch Video Solution

376. Differentiate $\log\left(x^x + \operatorname{cosec}^2 x\right) w.r.t.x$

Watch Video Solution

377. If $x^p . y^q = (x + y)^{p+q}$, show that $\frac{dy}{dx} = \frac{y}{x}$;

Watch Video Solution

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

Watch Video Solution

379. Differentiate the following w.r.t.x.

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

Watch Video Solution

380. If $x^x + y^x = 1$, prove that : $\frac{dy}{dx} = -\left[\frac{x^x(1 + \log x) + y^x. \log y}{x. y^{(x-1)}}\right]$

Watch Video Solution

381. If $x^y + y^x = 1$, find $\frac{dy}{dx}$

Watch Video Solution

382. If $x^y + y^x = \log a$, find $\frac{dy}{dx}$.

Watch Video Solution

383. Show that if $x^y + y^x = m^n$, then:

$$\frac{dy}{dx} = -\frac{y^x \log y + yx^{y-1}}{x^y \log x + xy^{x-1}}$$

Watch Video Solution

384. Find the derivative of the function given by $f(x) = (1 + x)\left(1 + x^2\right)\left(1 + x^4\right)\left(1 + x^8\right)$ and hence find $f'(1)$

Watch Video Solution

385. Differentiate $\left(x^2 - 5x + 8\right)\left(x^3 + 7x + 9\right)$ by using product rule.

Watch Video Solution

386. Differentiate $\left(x^2 - 5x + 8\right)\left(x^3 + 7x + 9\right)$ by expanding the product to obtain a single polynomial.

Watch Video Solution

387. Differentiate $\left(x^2 - 5x + 8\right)\left(x^3 + 7x + 9\right)$ by logarithmic differentiation.

Watch Video Solution

388. If $y = \left(\sqrt{x}\right)^{\sqrt{x}^{\sqrt{x}}} \ldots\ldots\ldots \to \infty\Big)$, prove that $\dfrac{dy}{dx} = \dfrac{y^2}{x(2 - y\log x)}$

Watch Video Solution

389. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \ldots\ldots\infty}}}$, show that $(2y - 1)\dfrac{dy}{dx} = 1$

Watch Video Solution

390. If $y = \sqrt{3^x + \sqrt{3^x + \sqrt{3^x + \ldots\ldots\ldots \infty}}}$, then prove that : $(2y - 1)\frac{dy}{dx} = 3^x \log 3$.

Watch Video Solution

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

Watch Video Solution

392. If $y = (\cos x)^{\cos x^{\cos x \ldots \ldots \ldots \to \infty}}$ prove that $\frac{dy}{dx} = \frac{-y^2 \tan x}{1 - y\log\cos x}$

Watch Video Solution

393. If $y=(\tan x)^{(\tan x)^{(\tan x)^{\cdots\infty}}}$, then prove that $\frac{dy}{dx}=2$ at $x=\frac{\pi}{4}$.

Watch Video Solution

394. If $y=\left(x^{x^{x}\cdots\cdots\cdots\cdot\to\infty}\right)$, prove that $x\frac{dy}{dx}=\frac{y^2}{1-y\log x}$.

Watch Video Solution

395. Find (a) $\frac{dy}{dx}$ and $(b)=\frac{d^2y}{dx^2}$ when y is given by :

1+2x

Watch Video Solution

396. Find (a) $\frac{dy}{dx}$ and $(b)=\frac{d^2y}{dx^2}$ when y is given by :

ax^3+bx^2+cx+d

Watch Video Solution

397. Find (a) $\frac{dy}{dx}$ and $(b) = \frac{d^2y}{dx^2}$ when y is given by :

1/(2x+3), x not equal to - 3/2 `

Watch Video Solution

398. Find (a) $\frac{dy}{dx}$ and $(b) = \frac{d^2y}{dx^2}$ when y is given by :

log x - x

Watch Video Solution

399. Find (a) $\frac{dy}{dx}$ and $(b) = \frac{d^2y}{dx^2}$ when y is given by :

$e^x + \sin x$

Watch Video Solution

400. Find (a) $\frac{dy}{dx}$ and $(b) = \frac{d^2y}{dx^2}$ when y is given by :

$e^x + x^4$

Watch Video Solution

401. Find the second derivative of the following functions:

x^{20}

Watch Video Solution

402. Find the second derivative of the following functions:

$x^2 + 3x + 2$

Watch Video Solution

403. Find the second order derivative of the function

x.cosx

Watch Video Solution

404. Find the second derivative of the following functions:

$x^3 + \tan x$

Watch Video Solution

405. Find the second derivative of the following functions:

$\tan^{-1} x$

Watch Video Solution

406. Find the second derivative of the following functions:

logx

Watch Video Solution

407. Find the second order derivative of the following functions

$x^3 \log x$

Watch Video Solution

408. Find the second derivative of the following functions:

log(logx)

Watch Video Solution

409. Find the second derivative of the following functions:

sin(logx)

Watch Video Solution

410. Find the second derivative of the following functions:

$e^{x}\sin 5x$

Watch Video Solution

411. Find the second derivative of the following functions:

$e^{6x}\cos 3x$

Watch Video Solution

412. Find the second derivative of the following functions:

$e^{-x}\cos x$

Watch Video Solution

413. Find the second derivative of the following functions:

$\tan x + \sec x$

Watch Video Solution

414. Find the second derivative of the following functions:

$$\frac{\log x}{x}$$

Watch Video Solution

415. Find the second derivative of the following functions:

x^x

Watch Video Solution

416. If $y = \sin^{-1} x$, then show that $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$

Watch Video Solution

417. If $y = \sin^{-1} x$, show that : $\left(1 - x^2\right)d^2\frac{y}{dx^2} - x\frac{dy}{dx} = 0$

Watch Video Solution

418. If $y = 3e^{2x} + 2e^{3x}$, prove that $d^2\frac{y}{dx^2} - 5\frac{dy}{dx} + 6y = 0.$

Watch Video Solution

419. If $y = Ae^{mx} + Be^{nx}$, Show that $\left(\frac{d^2}{dx^2}y\right) - (m+n)\frac{dy}{dx} + mny = 0$

Watch Video Solution

420. Find the second order derivative of the following functions

If $y = Pe^{ax} + Qe^{bx}$ show that $\frac{d^2y}{dx^2} - (a+b)\frac{dy}{dx} + aby = 0$

Watch Video Solution

421. $y = 5\cos x - 3\sin x$, prove that $\frac{d^2y}{dx^2} + y = 0$

Watch Video Solution

422. If $e^{y}(x+1)=1$ show that $\left(d^{2}\frac{y}{dx^{2}}\right)=\left(\frac{dy}{dx}\right)^{2}$ ਹੈ।

Watch Video Solution

423. If $y=A\sin x+B\cos x$then prove that $d^{2}\frac{y}{dx^{2}}+y=0$

Watch Video Solution

424. Find $\frac{d^{2}}{dx^{2}}$ in the following :

$x=at^{2}, y=2at$

Watch Video Solution

425. Find $\frac{d^2}{dx^2}$ in the following :

$x = a\cos\theta, y = b\sin\theta$

Watch Video Solution

426. Find $\frac{d^2}{dx^2}$ in the following :

$x = a\cos^3\theta, y = a\sin^3\theta$

Watch Video Solution

427. Find $\frac{d^2y}{dx^2}$ in the following

$x = a\cos^3\theta, y = a\sin^3\theta$

Watch Video Solution

428. Find $\frac{d^2}{dx^2}$ in the following :

If $x = a\cos^3\theta$ and $y = a\sin^3\theta$, then find the value of $d^2\frac{y}{dx^2}\Big)at\theta = \frac{\pi}{6}$

Watch Video Solution

429. Find $\frac{d^2}{dx^2}$ in the following :

`x = a (cost + t sin t), y = a (sin t - t cos t)

Watch Video Solution

430. Find $\frac{dy^2}{dx^2}$ in the following :

$x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$

Watch Video Solution

431. Find $\frac{d^2y}{dx^2} at\theta = \frac{\pi}{2}$ when:

$x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$

Watch Video Solution

432. Find $\frac{d^2y}{dx^2} at\theta = \frac{\pi}{2}$ when:

$x = a(1 - \cos\theta), y = a(\theta + \sin\theta)$

Watch Video Solution

433. Find $\frac{d^2y}{dx^2} at\theta = \frac{\pi}{2}$ when:

$x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$

Watch Video Solution

434. Find $\dfrac{d^2y}{dx^2}$ when : $x = 2\cos\theta - \cos 2\theta$ and $y = 2\sin\theta - \sin 2\theta$.

Watch Video Solution

435. If $x = a\sin t$ and $y = a\left(\cos t + \log\tan\left(\frac{t}{2}\right)\right)$, find $\dfrac{d^2y}{dx^2}$

Watch Video Solution

436. If $y = \left(\sin^{-1}x\right)^2$, then prove that $(1 - x)^2\dfrac{d^2y}{dx^2} - x\dfrac{dy}{dz} = 2$

Watch Video Solution

437. If $y = \left(\cos^{-1}x\right)^2$ show that $\left(1 - x^2\right)^2y_2 - xy_1 = 2$

Watch Video Solution

438. If $y = \left[\tan^{-1}x\right]^2$, then prove that : $\left(x^2 + 1\right)^2 y_2 + 2x\left(x^2 + 1\right)y_1 = 2.$

Watch Video Solution

439. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = x^2 + 2.\ a = -2,\ \text{and}\ b = 2$

Watch Video Solution

440. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = \frac{x^3}{3} - \frac{5}{3}x^2 + 2x,\ x \in [0, 3]$

Watch Video Solution

441. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = \dfrac{x(x - 2)}{x - 1}$ on [0,2]

Watch Video Solution

442. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = x^2 + 2x - 8$ defined in the interval [-4,2]

Watch Video Solution

443. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = x^2 \in [-1, 1]$

Watch Video Solution

444. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = x^{1/3} \in [-1, 1]$

Watch Video Solution

445. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = |x| \in [-1, 1]$

Watch Video Solution

446. Verify the truth of Rolle's Theorem for the following functions:

f(X) = |x-1| in [1,2]

Watch Video Solution

447. Verify the truth of Rolle's Theorem for the following functions:

$f(x) = \sqrt{x - 2}$in [1,2]

Watch Video Solution

448. Verify the truth of Rolle's Theorem for the following functions:

f(X) = [x]in [-1,1]

Watch Video Solution

449. Verify the conditions of Rolle's Theorem in the followin problems. In eah case, find a point in the interval where the derivative vanishes:

$x^{20} on[- 1, 1]$

Watch Video Solution

450. Verify the conditions of Rolle's Theorem in the followin problems. In eah case, find a point in the interval where the derivative vanishes:

$(x + 1)(x - 2) on [- 1, 2]$

Watch Video Solution

451. Verify the conditions of Rolle's Theorem in the followin problems. In eah case, find a point in the interval where the derivative vanishes:

$\sin x - \sin 2x on [0, \pi]$

Watch Video Solution

452. Verify the conditions of Rolle's Theorem in the followin problems. In eah case, find a point in the interval where the derivative vanishes derivative vanishes:

$\log\left(x^2 + 2\right) - \log 3 on[-1, 1]$

Watch Video Solution

453. Verify the conditions of Rolle's Theorem in the followin problems. In eah case, find a point in the interval where the derivative vanishes:

$e^{1 - x^2}$ on [-1,1]

Watch Video Solution

454. Verify the truth of Rolle's Theorem for the following function:

$f(x) = x^2 - 5x + 4 on[1, 4]$

Watch Video Solution

455. Verify the truth of Rolle's Theorem for the following function:

$f(x) = 4x^2 - 12x + 9$ in the interval $0 \leq x \leq 3$

Watch Video Solution

456. Verify the Rolle's Theorem for the following function:

$f(x) = x^2 + 2x - 8$ in the interval [-4,2]

Watch Video Solution

457. Verify the truth of Rolle's Theorem for the following function:

$f(x) = x^2 - x - 12$ in the interval [-3,4]

Watch Video Solution

458. Verify the truth of Rolle's Theorem for the following function:

$f(x) = (x - 2)(x - 3)(x - 4)$ in the interval $2 \le x \le 4$

Watch Video Solution

459. Verify the truth of Rolle's Theorem for the following function:

$f(x) = x^3 - 4x$ in the interval $-2 \le x \le 2$

Watch Video Solution

460. Verify the truth of Rolle's Theorem for the following function:

$f(x) = x(x - 1)^2$ in the interval [0,1]

Watch Video Solution

461. Verify Rolle's theorem for the following functions

$f(x) = (x - 2)(x - 4)^2$ in the interval $[2, 4]$

Watch Video Solution

462. Verify Rolle's Theorem in the interval [a,b] for the fraction: $f(x) = (x - a)^m(x - b)^n, m$ and n being positive integers. Find the value of 'c'.

Watch Video Solution

463. Examine the applicability of Rolle's Theorem fr the fraction:

$f(x) = 2 + (x - 1)^{2/3}$ in the interval $0 \le x \le 2$

Watch Video Solution

464. Verify Rolle's Theorem for the function:

$f(x) = \sin^2 x$, defined in the interval $[0, \pi]$

Watch Video Solution

465. Verify Rolle's Theorem for the function:

$f(x) = \cos x$, defined in the interval $\left[\frac{\pi}{2}, \frac{\pi}{2}\right]$

Watch Video Solution

466. Verify Rolle's Theorem for the function:

$f(x) = \tan x$, define in the interval $[0, \pi]$

Watch Video Solution

467. Verify Rolle's Theorem for the function:

$$f(x) = \sin x + \cos x \in \left[0, \frac{\pi}{2}\right]$$

Watch Video Solution

468. Verify Rolle's Theorem for the function:

$$f(x) = \sin x + \cos x - 1 \in \left[0, \frac{\pi}{2}\right]$$

Watch Video Solution

469. Verify Rolle's Theorem for the function:

$$f(x) = \sin x + \cos x \in \left[0, \frac{\pi}{2}\right]$$

Watch Video Solution

470. Verify Rolle's Theorem for the function:

$f(x) = \sin^4 x + \cos^4 x$ in the interval $\left[0, \frac{\pi}{2}\right]$

Watch Video Solution

471. Find the value of f(x) when x=5:

$f(x) = -4x + 5$

Watch Video Solution

472. At what points on the following curve, is the tangent parallel to x-axis? $y = x^2 on[-2, 2]$

Watch Video Solution

473. At what points on the following curve, is the tangent parallel to x-axis? $y = \cos x - 1 on[0, 2\pi]$

Watch Video Solution

474. For the function $f(x) = x^3 - 6x^2 + ax + b$, it is given that f(1) = f(3) = 0. Find the values of 'a' and 'b', and hence verify Rolle's Theorem on [1,3]

Watch Video Solution

475. Let $f(x) = (x - 1)(x - 2)(x - 3)$ on the interval [1,3]. Prove that there is more than one c in (1,3) such that $f' © = 0$

Watch Video Solution

476. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = x^2 - 1 on[1, 2]$

Watch Video Solution

477. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = x^2 on[2, 4]$

Watch Video Solution

478. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = x^2 - 2x + 3 \in [0, 4]$

Watch Video Solution

479. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = 2x^2 - 10x + 29 \in [2, 7]$

Watch Video Solution

480. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = x^2 - 4x - 3 \in [1, 4]$

Watch Video Solution

481. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = 2x - x^2 \in [0, 1]$

Watch Video Solution

482. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = 2x - x^2 \in [0, 1]$

Watch Video Solution

483. Verify Lagrange's mean value theorem for the following functions

$f(x) = x^3 - 2x^2 - x + 3$ in the interval $[0, 1]$

Watch Video Solution

484. Discuss the applicability of Lagrange's Mean Value Theorem to

$f(x) = x^3 - 5x^2 - 3x \in [1, 3]$

Watch Video Solution

485. Verify Lagrange's Mean Value Theorem for the function :

$f(x) = x(x - 1)(x - 2)(x - 3)$ in the interval $[0, 4]$

Watch Video Solution

486. Verify the conditions of Mean Value Theorem in the following. In each case. Find a point in the interval as stated by the Mean Value Theorem:

f(x) = x on [a,b]

Watch Video Solution

487. Verify the conditions of Mean Value Theorem in the following. In each case. Find a point in the interval as stated by the Mean Value Theorem:

$$f(x) = x + \frac{1}{x} on[1, 3]$$

Watch Video Solution

488. Verify the conditions of Mean Value Theorem in the following. In each case. Find a point in the interval as stated by the Mean Value Theorem:

$f(x) = ax^2 + bx + ex + don[0, 1]$

Watch Video Solution

489. Verify the conditions of Mean Value Theorem in the following. In each case. Find a point in the interval as stated by the Mean Value Theorem:

$f(x) = ax^2 + ex + e$ on [0,1]

Watch Video Solution

490. Verify the conditions of Mean Value Theorem in the following. In each case. Find a point in the interval as stated by the Mean Value Theorem:

$f(x)\sin x - \sin 2x$on $[0, 2\pi]$

Watch Video Solution

491. Verify the conditions of Mean Value Theorem in the following. In each case. Find a point in the interval as stated by the Mean Value Theorem:

$f(x) = \sin x - \sin 2x on[0, \pi]$

Watch Video Solution

492. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = x^{1/3}$ in the interval [-1,1]

Watch Video Solution

493. Verify Lagrange's mean value theorem for the following functions

$f(x) = (x - 1)^{2/3}$ in the interval $[1, 2]$

Watch Video Solution

494. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \frac{1}{x}$ in the interval [-1.2]

Watch Video Solution

495. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \frac{1}{4x - 1}$, in the interval [-1,4]

Watch Video Solution

Watch Video Solution

496. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = |x|$in the interval [-1,1]

Watch Video Solution

497. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \sqrt{x^2 - 4}$ in the interval [2,4]

Watch Video Solution

498. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \sqrt{25 - x^2}$ in the interval [-3,4]

Watch Video Solution

499. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \log_e x$in the interval [1,2]

Watch Video Solution

500. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \alpha on[a, b]$

Watch Video Solution

501. Find 'c' of Lagrange's Mean Value Theorem for the functions:

$f(x) = 2x^2 - 1$ in the interval [1,2]

Watch Video Solution

502. Find 'c' of Lagrange's Mean Value Theorem for the functions:

$f(x) = \log x$ in the interval [1,e]

Watch Video Solution

503. Find 'c' of Lagrange's Mean Value Theorem for the functions:

$f(x) = e^x$ in the interval [0,1]

Watch Video Solution

504. Verify Mean Value Theorem, if $f(x) = x^3 - 5x^2 - 3x$, in the interval [a, b], where a = 1 and b = 3. Find all $c \in (1, 3)$ for which $f'(c) = 0$.

Watch Video Solution

505. Verify Lagrange's Mean Value Theorem for the function : $f(x) = x(x - 1)(x - 2)(x - 3)$ in the interval $[0, 4]$

Watch Video Solution

506. Verify Lagrang'e Mean value Theorem for the function:

$$f(x) = \begin{cases} 2 + x^3 & \text{if} \quad x \leq 1 \\ 3x & \text{if} \quad x > 1 \end{cases} on[- 1, 2]$$

Watch Video Solution

507. Find a point on the parabola $y = (x - 2)^2$, where the tangent is parallel to the chord joining (2,4) and (4,4)

Watch Video Solution

508. Find a point on the curve $y = x^3$, where the tangent to the curve is parallel to the chord joining the points (1, 1) and (3, 27).

Watch Video Solution

509. 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

510. Find the co-ordinates of the point at which the tangent to the curve given by $f(x) = x^2 - 6x + 1$ is parallel to the chord joining the points (1,-4) and (3,-8)

Watch Video Solution

511. Use Lagrange's Mean value Theorem to determine a point P on the curve $y = \sqrt{x - 2}$, where the tangent is parallel to the chord joining (2,0) and (3,1)

Watch Video Solution

512. Examine the continuity of the function:

$$f(x) = \begin{matrix} \frac{x-4}{2(x-4)} & \text{if} \quad x \neq 4 \\ 0 & \text{if} \quad x = 4 \end{matrix}$$ at x =4

Watch Video Solution

513. Find the value of 'k', such that the function :

$f(x) = \left\{ \frac{2x^{x+2} - 16}{4^x - 16}, \quad \text{if} \quad x \neq 2 \right), (k, \quad \text{if} \quad x = 2)$ is continuous at x =2

Watch Video Solution

514. Given f(x) $= \frac{1}{x - 1}$. Find the points of discontinuity of the composite function f(f(x))

Watch Video Solution

515. Find f' (x) when $f(x) = 2^{\cos^2 x}$

Watch Video Solution

516. Find f' (x) when $f(x) = \sin^{-1}\left(\frac{1}{\sqrt{x + 1}}\right)$

Watch Video Solution

517. If $\sin x = \frac{2t}{1 + t^2}, \tan y = \frac{2t}{1 - t^2}$, find $\frac{dy}{dx}$

Watch Video Solution

518. If $y = \sec^{-1}\left(\frac{1}{4x^3 - 3x}\right)$, find $\frac{dy}{dx}$

Watch Video Solution

519. Find $\frac{dy}{dx}$ when $\tan^{-1}\left(x^2 + y^2\right) = 0$

Watch Video Solution

520. Examine the differentiability of the function

$f(x) = \begin{cases} x[x] & \text{if } 0 \le x < 2 \\ (x - 1)x & \text{if } 2 \le x < 3 \end{cases}$ at x =2

Watch Video Solution

521. Show that |x-5| is continuous but not differentiable at x =5.

Watch Video Solution

522. A function $f: R \rightarrow R$ satisfies the equation $f(x = y) = f(x). f(y)$ for all, $f(x) \neq 0$. Suppose that the function is differentiable at x = 0 and f'(0) = 2. Then,

Watch Video Solution

523. If $x = e^{x/y}$, prove that $\frac{dy}{dx} = \frac{x - y}{x\log x}$

Watch Video Solution

524. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = \dfrac{1}{4x - 1}$, in the interval [-1,4]

Watch Video Solution

525. Verify LMV Theorem for the following:

$f(x) = \sin x - \sin 2x \text{in}[0, \pi]$

Watch Video Solution

526. Verify LMV Theorem for the following:

$f(x) = \sqrt{25 - x^2} \text{in}[1, 5]$

Watch Video Solution

527. The function $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$, then then value of $'k'$ is

A. 3

B. 2

C. 1

D. 1.5

Answer:

Watch Video Solution

528. The function f(x) = [x], where [x] denotes the greatest integer function, is continuous at

A. 4

B. -2

C. 1

D. 1.5

Answer:

Watch Video Solution

529. The value of 'k' which makes the function defined by :

$$f(x) = \begin{cases} \sin\left(\frac{1}{x}\right) & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$$ continuous at x =0 is

A. 8

B. 1

C. -1

D. None of these

Answer:

Watch Video Solution

530. If $u = \sin^{-1}\left(2\frac{x}{(1+x)^2}\right)$ and $v = \tan^{-1}\left(2\frac{x}{1-x^2}\right)$, the $d\frac{u}{d}v$ is

A. $\frac{1}{2}$

B. x

C. $\frac{1-x^2}{1+x^2}$

D. 1

Answer:

Watch Video Solution

531. If $x = t^2, y = t^3$, then $\frac{d^2y}{dx^2}$ is

A. $\frac{3}{2}$

B. $\frac{3}{4t}$

C. $\frac{3}{2t}$

D. $\frac{3t}{2}$

Answer:

Watch Video Solution

532. The value of 'c' in Rolle's Theorem for the function $f(x) = x^3 - 3x$ in the interval $\left[0, \sqrt{3}\right]$ is

A. 1

B. -1

C. $\frac{3}{2}$

D. $\frac{1}{3}$

Answer:

Watch Video Solution

533. The value of 'c' in mean Value Theorem for the function $f(x) = x(x - 2) \in [1, 2]$ is

A. $\frac{3}{2}$

B. $\frac{2}{3}$

C. $\frac{1}{2}$

D. $\frac{3}{4}$

Answer:

Watch Video Solution

534. The derivative of f(x) =|x | at x=0 is

A. 1

B. 0

C. -1

D. Does not exist.

Answer:

Watch Video Solution

535. The derivative of log(ax+b) is

A. $\frac{1}{ax+b}$

B. $\frac{b}{ax+b}$

C. $\frac{a}{ax+b}$

D. $\frac{A+b}{ax+b}$

Answer:

Watch Video Solution

536. If $f(x) = \begin{cases} kx+1 & x \leq 5 \\ 3x-5 & x > 5 \end{cases}$ s is a continuous function then the value of k is

A. $\frac{9}{5}$

B. 3

C. $\frac{11}{5}$

D. None of these

Answer:

Watch Video Solution

537. The derivative of $\sin^3\left(x^5\right)$ w.r.t. x is

A. $\cos^3\left(x^5\right)$

B. $3\sin^2\left(5x^4\right)$

C. $15\sin^2\left(x^5\right)x^4$

D. None of these

Answer:

Watch Video Solution

538. If $y = \log\left(\cos e^x\right)$, then $\frac{dy}{dx} = \dots\dots\dots$

A. $-\tan\left(e^x\right).\ e^x$

B. $\frac{e^x}{\cos e^x}$

C. $\frac{1}{\sin\left(e^x\right)}$

D. None of these

Answer:

Watch Video Solution

539. If $y = e^{\sin(\log x)}$, then the value of $\frac{dy}{dx}$ is

A. $e^{\cos(\log x)}$

B. $e^{\sin(\log x)}.\cos(\log x)$

C. $\left(\frac{e^{\sin(\log x)}.\cos(\log x)}{x}\right.$

D. None of these

Answer:

Watch Video Solution

540. If $x^3 + y^3 = 10$, then the vale of $\frac{dy}{dx}$ is

A. - $\frac{y^2}{x^2}$

B. - $\frac{x^2}{y^2}$

C. $\frac{x^2}{y^2}$

D. None of these

Answer:

Watch Video Solution

541. If $f(x) = \begin{cases} kx^2 & x < 2 \\ 3 & x \geq 2 \end{cases}$ is continous at x =0, the value of 'k' is

A. $\frac{2}{3}$

B. $\frac{4}{3}$

C. $\frac{3}{2}$

D. $\frac{3}{4}$

Answer:

Watch Video Solution

542. If $x = 2at, y = at^2$, then $\frac{dx}{dy}$ is equal to :

A. $\frac{1}{t}$

B. t

C. $-\frac{1}{t}$

D. $-t$

Answer:

Watch Video Solution

543. If the function f is defined by $f(x) = \begin{cases} 3 & x \neq 0 \\ a+1 & x = 0 \end{cases}$ and f is continuous at x = 0, then value of a is :

A. 1

B. 2

C. 3

D. 4

Answer:

Watch Video Solution

544. The derivative of $\cos^{-1}\left(e^{x}\right)$ is

A. $\sin^{-1}\left(e^{x}\right).\, e^{x}$

B. $\dfrac{-e^{x}}{\sqrt{1-e^{2x}}}$

C. $\dfrac{e^{x}}{\sqrt{1-e^{2x}}}$

D. None of these

Answer:

Watch Video Solution

545. Find the derivative of sin (logx) (x>0) w.r.t.x

A. $\dfrac{\cos(\log x)}{x}$

B. x cos (logx)

C. log x cos (logx)

D. None of these

Answer:

Watch Video Solution

546. The derivative of log (cosec x) is

A. $-\cot x$

B. $-\operatorname{cosec} x$

C. $-\operatorname{cosec} x \cot x$

D. sin x tan x.

Answer:

Watch Video Solution

547. The derivative of $\sin x^2 w.r.t.$ x^2` is

A. $\cos x^2$

B. $2x\cos x^2$

C. $\frac{\sin 2x}{2x}$

D. $\frac{\cos x^2}{2x}$

Answer:

Watch Video Solution

548. If $y = \log x - x^2$, then value of $\frac{d^2y}{dx^2}$ is

A. $-\frac{1}{x^2} + 1$

B. $-\frac{1}{x^2}$

C. $\frac{1}{x} - 2x$

D. $-\frac{1}{x^2}-2$

Answer:

Watch Video Solution

549. The function f(x) = |x| + |x-1| + |x-2| is continuous but not differentiable at for all x $\in$ R x=-1 and x=1

Watch Video Solution

550. The value of 'c' for which Lagrange's Mean value Theorem is applicable to f$(x) = x^{1/2}$in `[0,4] is

A. 1

B. 4

C. 2

D. $\frac{1}{4}$

Answer:

Watch Video Solution

551. At x = 0, the function f(x) = |x| is

A. Continuous but not differentiable

B. Differentiable but not continuous

C. Both continuous and differentiable

D. Neither continuous nor differentiable.

Answer:

Watch Video Solution

552. How many of the function f(x) =|x|, g (x)= $\left|x^2\right|$ and h $(x) = [x]^3$ are not differentiable at x = 0?

A. 0

B. 1

C. 2

D. 3

Answer:

Watch Video Solution

553. $f(x) = \begin{cases} \frac{x^2-4}{x-2} & x \neq 2 \\ 2k & x = 2 \end{cases}$ is continuous at x=2 then k=

A. 2

B. 4

C. 6

D. None of these

Answer:

Watch Video Solution

554. If $f(x) = x^2 + 5x + 2$, then f'(3) is

A. 11

B. 12

C. 10

D. None of these

Answer:

Watch Video Solution

Watch Video Solution

555. The derivative of cos 5x w.r.t x is

A. 5 sin 5x

B. sin 5x

C. $-5\sin 5x$

D. None of these

Answer:

Watch Video Solution

556. If $x = at^2, y = 2at$, than $\frac{dy}{dx}$ is

A. t

B. $\frac{2}{t}$

C. $\frac{1}{t}$

D. None of these

Answer:

Watch Video Solution

557. If function defined by : $f(x) = \begin{cases} \frac{\sin 3x}{2x} & x \neq 0 \\ k + 1 & x = 0 \end{cases}$ is continuous at x = 0, then value of k is :

A. 0

B. $\frac{3}{2}$

C. $\frac{1}{2}$

D. 1

Answer:

Watch Video Solution

558. If $f(x) = \log_x(\log x)$ then the value of f'(e) is

A. e

B. $\frac{2}{e}$

C. $\frac{1}{e}$

D. 0

Answer:

Watch Video Solution

559. If $f(x) = \log_x\{\ln(x)\}$ then $f'(x)$ at $x = e$, is

A. 0

B. 1

C. $\frac{1}{e}$

D. $\frac{1}{2e}$

Answer:

Watch Video Solution

560. If $x = ct, y = \frac{c}{t}$, find $\frac{dy}{dx} att = 2$

A. $\frac{1}{4}$

B. 4

C. - $\frac{1}{4}$

D. 0

Answer:

Watch Video Solution

Watch Video Solution

561. Let $f(x) = \begin{cases} ax + 3 & x \leq 2 \\ a^2x - 1 & x > 2 \end{cases}$. Then the value of 'a' for which 'f' is continuous for all x are

A. 1 and -2

B. 1 and 2

C. -1 and 2

D. -1 and -2

Answer:

Watch Video Solution

562. Let R be the set of all real numbers. Let $f: R \to R$ be a function such that : $|f(x) - f(y)|^2 \leq |x - y|^2, \forall x, y \in R$. Then f(x) =

A. x

B. 1

C. 0

D. x^2

Answer:

Watch Video Solution

563. Let $f(x) = x^2 + bx + 7$. If f'(5) = 2f'$\left(\frac{7}{2}\right)$, then the value of 'b' is

A. 4

B. 3

C. -4

D. -3

Answer:

Watch Video Solution

564. The funtion f(x) = $\begin{cases} 2x^2 - 1 & \text{if } 1 \le x \le 4 \\ 151 - 30x & \text{if } 4 < x \le 5 \end{cases}$ is not suitable to apply Rolle's theorem since

A. f(x) is not continuous on [1,5]

B. $f(x) \neq f(5)$

C. f(x) is continuous only x = 4

D. f(x) is not differentiable in (4,5)

Answer:

Watch Video Solution

565. Let f(x) be a differentiable function and f'(4) = 5, then:

$$\lim_{x \to 2} \frac{f(4) - f\left(x^2\right)}{x - 2}$$ equals:

A. 0

B. 5

C. 20

D. -20

Answer:

Watch Video Solution

566. Determine if f defined by : $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$

is a continuous function?

A. f satisfies the conditions of Rolle's theorem on [-1,1]

B. f satisfies the conditions of Lagrange's Mean value theorem on [-1,1]

C. f satifies the conditions of Rolle's theorem on [0,1]

D. f satisfies the conditions of Lagrange's Mean value of theorem on [0,1]

Answer:

Watch Video Solution

567. If $y=(1+x)\left(1+x^2\right)\left(1+x^4\right)$, then $\frac{dy}{dx}$ at x = 1 is

A. 20

B. 28

C. 1

D. 0

Answer:

Watch Video Solution

568. The value of $\frac{d}{dx}\left\{\tan^{-1}(\cos x)\right\}$ for x= 30 is equal to

A. $\frac{1}{2}$

B. $\frac{1}{-2}$

C. 1

D. $\frac{\sin x}{(1+\sin x)^2}$

Answer:

Watch Video Solution

569. If $f(x) = \begin{cases} \frac{x^2 - (a+2)x + a}{x-2} & x \neq 2 \\ 2 & x = 2 \end{cases}$ is continuous at x =2, then the value of a is

A. -1

B. -6

C. 0

D. 1

Answer:

Watch Video Solution

570. Let $g(x) = \frac{(x-1)^3}{\log(x-1)}$ Find g(5).

Watch Video Solution

571. Let y be an implict function of x defined by $x^{2x} - 2x^{x}\cot y - 1 = 0$

Then y'(1) equals

A. -2

B. 1

C. log2

D. $-\log 2$

Answer:

Watch Video Solution

572. Let $f:(-1, 1) \rightarrow R$ be a differentiable function with f(0) = -1 and f'(0) = 1 let g(x) =[f(2f(x)+2)]^2`, then g'(0) =

A. 4

B. -4

C. log2

D. $-\log 2$

Answer:

Watch Video Solution

573. If 'f' is differentiable at x = a, find $\left(\lim_{x \to a} \frac{x^2 f(a) - a^2 f(x)}{x - a}\right)$

A. $a^2 f(a)$

B. $af(a) - a^2 f'(a)$

C. $2af(a) - a^2 f'$

D. $2af(a) + a^2 f'(a)$

Answer:

Watch Video Solution

574. If $f: R \to R$ is a function defined by: $f(x) = [x]\cos\left(\frac{2x-1}{2}\right)\pi$, where [x] denotes the greatest integer function, then 'f' is

A. continous for every real x

B. discontinuous only at x =0

C. discontinuous only at non-zero integral values of x

D. continuous only at x =0

Answer:

Watch Video Solution

575. Let $f(x) = \left\{x^2\left|(\cos)\frac{\pi}{x}\right|, x \neq 0 \text{ and } 0, x = 0, x \in \mathbb{R},\right.$ then f is

a. differentiable both at x = 0 and at x = 2

b. differentiable at x = 0 but not differentiable at x = 2

c. not differentiable at x = 0 but differentiable at x = 2

d. differentiable neither at x = 0 nor at x = 2

A. differentiable both at x = 0 and at x =2

B. differentiable at x = 0 but not differentiable at x=2

C. not differentiable at x = 0 but differentiable at x = 2

D. differentiable neiter at x = 0 nor at x =2

Answer:

Watch Video Solution

576. If $y = \sec\left(\tan^{-1}x\right)$, then $\frac{dy}{dx}$ at x =1 is equal to

A. $\frac{1}{2}$

B. 1

C. $\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

Answer:

Watch Video Solution

577. If g is te inverse of a function f and $f'(x) = \frac{1}{1 + x^5}$ then g'(x) is equal to

A. $5x^4$

B. $\frac{1}{1 + g(x)^5}$

C. $1 + (g(x))^5$

D. $1 + x^5$

Answer:

Watch Video Solution

578. If the function $g(x) = \begin{cases} k\sqrt{x+1}, & 0 \le x \le 3 \\ mx + 2, & 3 < x \le 5 \end{cases}$ is differentiable, then the value of k + m is

A. 2

B. $\frac{16}{5}$

C. $\frac{10}{3}$

D. 4

Answer:

Watch Video Solution

579. For $x \in R$, $f(x) = |\log 2 - \sin x|$ and $g(x) = f(f(x))$, then

A. g is not differentiable at x = 0

B. g'(0) = cos(log2)

C. g'(0) = -cos(log2)

D. g is differentiable at x = 0 and g'(0) = -sin (log2)

Answer:

Watch Video Solution

580. A function $f: R \rightarrow R$ is defined as follows:

$f(x) = \begin{cases} x & \text{if } x \leq 1 \\ 5 & \text{if } x > 1 \end{cases}$ which one of the following is true?

A. f is continuous at 0 and 1

B. f is continuous at 1 and 2

C. f is continuous at 0 and 2

D. f is continuous at 0,1 and 2

Answer:

Watch Video Solution

581. If $\sqrt{x}+\sqrt{y}=4, then \frac{dy}{dx} is$

A. $-\sqrt{\left(\frac{x}{y}\right)}$

B. $-\sqrt{\frac{y}{x}}$

C. $\sqrt{\frac{x}{y}}$

D. $\sqrt{\frac{y}{x}}$

Answer:

Watch Video Solution

582. Find $\frac{dy}{dx}$ when x = 4t, $y = \frac{4}{t}$

Watch Video Solution

583. The funtion f(x) is defined as follows:

$$f(x) = \begin{cases} x^2 + ax + b & 0 \le x < 2 \\ 3x + 2 & 2 \le x \le 4 \\ 2ax + 5b & 4 < x \le 8 \end{cases}$$ If f(s) is continuous on [0,8], find the values of 'a' and 'b'.

Watch Video Solution

584. If $y = \tan^{-1}\left(\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}\right)$, then show that $\frac{dy}{dx} = \frac{x}{\sqrt{1-x^4}}$

Watch Video Solution

585. If $x^Y = e^{X-Y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$.

Watch Video Solution

586. If $y = e^{ax}\sin bx$, prove that $d^2\frac{y}{dx^2} - 2a\frac{dy}{dx} + \left(a^2 + b^2\right)y = 0$.

Watch Video Solution

587. Verify Rolle's theorem for function $f(x) = \sin x + \cos x$ in the interval $[0, 2\pi]$.

Watch Video Solution

588. Find $\frac{dy}{dx}$, if $y^x + x^y + x^x = a^b$

Watch Video Solution