MATHS

BOOKS - PRADEEP PUBLICATION

CONTINUITY AND DIFFERENTIABILITY

EXAMPLE

1. The function f defined as $f(x) = \begin{cases} \frac{\sin x^2}{x} & x \neq 0 \\ 0 & 0 \end{cases}$ is :

Watch Video Solution

2. Discuss the continuity of the function $f(x) = \begin{cases} x^2 & x \leq 0 \\ 1 - x & x > 0 \end{cases} at x = 0$

Watch Video Solution

3. Find the value of $f\left(\frac{\pi}{4}\right)$ so that the function $f(x) = \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, x \neq \frac{\pi}{4}$, becomes continuous at $x = \frac{\pi}{4}$

Watch Video Solution

4. 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

5. 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

6. Discuss the continuity of the function :

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

Watch Video Solution

7. Let $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x & when x \neq 0 \\ 2 & when x = 0 \end{cases}$ show that f (x) is continouous at x = 0.

Watch Video Solution

8. Let 'f' be the function defined by $f(x) = \frac{\sqrt{4+x} - 2}{x}, x \neq 0$. What choice, if any, of f (0) will make it continuous at x = 0?

Watch Video Solution

9. 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

10. If the function $f(x) = \begin{cases} 3ax + b & \text{if } x > 1 \\ 11 & \text{if } x = 1 \\ 5ax - 2b & \text{if } x < 1 \end{cases}$ is continuous at x = 1, find the values of a,b.

Watch Video Solution

11. Find a,b so that the function $f(x) = \begin{cases} 1 & x \leq 3 \\ ax + b & 3 < x < 5 \\ 7 & x \geq 5 \end{cases}$ may be continuous at x = 3 and x = 5

Watch Video Solution

12. Let $f(X) = \begin{cases} (x-1)\tan\left(\frac{\pi}{2}x\right) & x \neq 1 \\ k & x = 1 \end{cases}$. Find k if f is continuous at x = 1.

Watch Video Solution

13. 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

14. Let $f(x)=\begin{cases}\frac{1-\cos 4x}{x^2}, & x<0 \\ a, & x=0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4}, & x>0\end{cases}$ Then, the value of a if possible, so that the function is continuous at x = 0, is.....

Watch Video Solution

15. Determine the value of the constant k so that the function $f(x)=\begin{cases}\frac{\sin 2x}{5x} & \text{if} \quad x \neq 0 \\ k & \text{if} \quad x=0\end{cases}$ is continuous at x = 0

Watch Video Solution

16. Examine for continuity, the function

$$f(x) = \begin{cases} |x-a|\sin\left(\frac{1}{x-a}\right) & \text{if } x \neq a \\ 0 \text{ if } x = a \end{cases}$$

Watch Video Solution

17. Let $f(x) = \begin{cases} \frac{1-\cos 2x}{2x^2} & x < 0 \\ k & x = 0 \\ \frac{x}{|x|} & x > 0 \end{cases}$. Find k if f is continous at x =0

Watch Video Solution

18. Examine for continuity, the function 'f' defined by

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

Watch Video Solution

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

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

Watch Video Solution

20. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at x = 0. Find the value of f(0) so that f is continuous at x = 0

Watch Video Solution

21. Let f(x) = [x] + [-x] for $x \neq 0$ and f (0) = λ. For what value of λ, if any, is f continuous at x = 0?

Watch Video Solution

22. Examine for cotinuity the function $f(x) = \begin{cases} 2+x & \text{if } x < 0 \\ -x+2 & \text{if } x > 0 \end{cases}$.

Watch Video Solution

23. Prove that the function $f(x) = \begin{cases} \frac{\sin x}{x} & x < 0 \\ x^2+1 & x \geq 0 \end{cases}$ is continuous.

Watch Video Solution

24. Discuss the continuity of the function $f(x) = \begin{cases} x & \text{if } x > 0 \\ x^2 & \text{if } x \leq 0 \end{cases}$.

Watch Video Solution

25. Find the value of k so that the function $f(x) = \begin{cases} kx + 5 & x \leq 2 \\ x - 1 & x > 2 \end{cases}$ may be continuous.

Watch Video Solution

26. Show that the function $f(x) = \begin{cases} x + \lambda & x < 1 \\ \lambda x^2 + 1 & x \geq 1 \end{cases}$ is a continous function. Regardless of the choice of $\lambda \in R$.

Watch Video Solution

27. 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

28. Locate the points of discontinuity of the function

$$f(x) = \begin{cases} (|x| + 3) & \text{if } x \leq -3 \\ -2x & \text{if } -3 < x < 3 \\ 6x + 2 & \text{if } x \geq 3 \end{cases}$$

Watch Video Solution

29. Let $f(x) = \begin{cases} 1 & x \leq -1 \\ \lambda x + \mu & -1 < x < 3 \\ 5 & x \geq 3 \end{cases}$ find λ and μ if f is a continuous function.

Watch Video Solution

30. Prove that the following functions are continuous:

$$\frac{x+2}{(x-1)(x-3)}$$

Watch Video Solution

31. Prove that the following functions are continuous:

|1+x+|x||

Watch Video Solution

32. Prove that the following functions are continuous:

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

Watch Video Solution

33. Find the domain of the continuity of the following functions:

$\sin^{-1}x-[x]$

Watch Video Solution

34. Find the domain of the continuity of the following functions:

$\sin^{-1} x - [x]$

Watch Video Solution

35. Find the domain of the continuity of the following functions:

$$\frac{\log x}{\sqrt{1-4x^2}}$$

Watch Video Solution

36. Let $f(x) = (x-a)\cos\left(\frac{1}{x-a}\right) f$ or $x \neq a$ and le f (a) = 0. Show that f is continuous at x = a but not derivable thereat.

Watch Video Solution

37. Show that the function $f(x) = \begin{cases} x^n \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ is continuous but not differentiable at x= 0.

Watch Video Solution

38. Show that the function $f(x) = \begin{cases} x^n \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ is continuous but not differentiable at x= 0.

Watch Video Solution

39. Show that the function $f(x) = \begin{cases} x^n \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ is continuous but not differentiable at x= 0.

Watch Video Solution

40. Let f(x) = x|x| for all x $\in$ R . Discuss continuity and derivability of f(X) at x = 0

Watch Video Solution

41. Show that $f(x) = |x - 5|$ is continuous but not differentiable at x = 5.

Watch Video Solution

42. Show that the function $f(x) = |x - 1| + 1 \mid f \text{ or } allx \in R$, is not differentiable at x = -1 and x =1

Watch Video Solution

43. Let $f(x) = \begin{cases} x + a & x \leq 1 \\ ax^2 + 1 & x > 1 \end{cases}$. Show that f is continuous at 1. Find 'a' so that it is derivable at 1.

Watch Video Solution

44. 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

45. Show that the function defined by:

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

Watch Video Solution

46. find derivative, find f' (2) when f(x) = 5^{3x}

Watch Video Solution

47. Let f(x) = log x, Evaluate f' (e) .

Watch Video Solution

48. Find the derivatives of the following functions from abinito e^2x

Watch Video Solution

49. Find the derivatives of the following functions from abinito log(3x-1)

Watch Video Solution

50. Find the derivatives of the following function $e^{\sqrt{\sin x}}$

Watch Video Solution

51. Find the derivatives of the following functions $2^{\sin^2 x}$

Watch Video Solution

52. Find $\frac{dy}{dx}$ when $y = e^x \log x$

Watch Video Solution

53. Find $\frac{dy}{dx}$ when $y = \frac{e^x - 1}{e^x + 1}$

Watch Video Solution

54. Find $\frac{dy}{dx}$ when $y = \frac{1 - \log x}{1 + \log x}$

Watch Video Solution

55. Find $\frac{dy}{dx}$ when $y = a^x x^a, a > 0$

Watch Video Solution

56. Find $\frac{dy}{dx}$ when $y = \frac{e^x}{1 + \sin x}$

Watch Video Solution

57. Find the derviatives of the following functions:

$3^x \tan x$

Watch Video Solution

58. Find the derviatives of the following functions:

$2 \log x - 3 \sin x + e^x$

Watch Video Solution

59. Differentiate the following functions: x sin log x

Watch Video Solution

60. Differentiate the following functions: $x^2 e^x \sin x$.

Watch Video Solution

61. Find $\left(\frac{dy}{dx}\right)$ when $y = 2u^3 + 1$ and $u = \frac{1}{x^{2/3}}$

Watch Video Solution

62. Differentiate $\left|2x^2 - 1\right|$ w.r.t.x.

Watch Video Solution

63. Differentiate $f(x) = (x+2)^{2/3}(1-x)^{1/3}) w.r.t.x$

Watch Video Solution

64. If $y = \log\left\{\left(e^x \frac{\left(\frac{x-2}{x+2}\right)^3}{4}\right)\right\}$, show that $\frac{dy}{dx} = \frac{x^2-1}{x^2-4}$

Watch Video Solution

65. Find the derivative of the function $\sqrt{a+\sqrt{a+x}}$ w.r.t.x

Watch Video Solution

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

Watch Video Solution

67. Find the derivatives of following w.r.t.x

$\sqrt{3x-2}, x>\frac{2}{3}$

Watch Video Solution

68. Find the derivatives of following w.r.t.x

$\left(4x^3-5x^2+1\right)^4$

Watch Video Solution

69. 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

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

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

Watch Video Solution

71. Find $\dfrac{dy}{dx}$ when $y = \dfrac{\sqrt{x + a} - \sqrt{x - a}}{\sqrt{x - a} + \sqrt{x + a}}$, where x > a > 0

Watch Video Solution

72. Differentiate the following w.r.t.x: $\sin x^3$

Watch Video Solution

73. Differentiate the following w.r.t.x: $\sin(\log x)$

Watch Video Solution

74. Differentiate the following w.r.t.x: $x \cot^8 x$

Watch Video Solution

75. Differentiate the followig $w.\ r.\ t.\ x$: sin3x sin^3 x`

Watch Video Solution

76. Differentiate the followig w.r.t.x:

$$\sqrt{\frac{\sec x - \tan x}{\sec x + \tan x}}$$

Watch Video Solution

77. Differentiate the followig w.r.t.x:

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

Watch Video Solution

78. Differentiate the following w.r.t.x $\left(\sqrt{\frac{\sec x-1}{\sec x+1}}\right.$

Watch Video Solution

79. Differentiate the following w.r.t.x $\left(\sqrt{\frac{1+\tan x}{1-\tan x}}\right.$

Watch Video Solution

80. Differentiate the following functions w.r.t.x

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

Watch Video Solution

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

$\log\sqrt{\frac{1-\cos x}{1+\cos x}}$

Watch Video Solution

82. Differentiate the following functions w.r.t.x

$\log_7(\log x)$

Watch Video Solution

83. Find the derivative of $\cos\left(\sin x^2\right) atx = \sqrt{\left(\frac{\pi}{2}\right)}$

Watch Video Solution

84. Differentiate the following functions w.r.t.x.

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

Watch Video Solution

85. Differentiate the following functions w.r.t.x.

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

Watch Video Solution

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

$$\log\left(\frac{x+\sqrt{x^2-a^2}}{x-\sqrt{x^2-a^2}}\right)$$

Watch Video Solution

87. 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

88. Find $\frac{dy}{dx}$ when $y=\sqrt{a+\sqrt{a}+\sqrt{a}+x^2}\Big)\Big)$, 'a' being constant.

Watch Video Solution

89. $y = \frac{\cos x + \sin x}{\cos x - \sin x}$, *provet^* dy/dx = $\sec^2\left(\frac{\pi}{4} + x\right)$

Watch Video Solution

90. If $y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$. Prove that $\frac{dy}{dx} = 1 - y^2$

Watch Video Solution

91. If $y = \sqrt{\frac{1+e^x}{1-e^x}}$, show that $\frac{dy}{dx} = \frac{e^x}{(1-e^x)\sqrt{1-e^2x}}, x < 0$

Watch Video Solution

92. If $y = \log\left|\frac{a - b\cos x}{a + b\cos x}\right|$, then show that $\frac{dy}{dy} = \frac{2ab\sin x}{a^2 - b^2\cos^2 x}$

Watch Video Solution

93. If $y = e^{3\log x + 2x}$, prove that $\frac{dy}{dx} = x^2(2x+3)e^{2x}$

Watch Video Solution

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

Watch Video Solution

95. If $x = \frac{1-t^2}{1+t^2}$ and $y = \frac{2t}{1+t^2}$, then show that $\left(\frac{dy}{dx}\right) + \frac{x}{y} = 0$

Watch Video Solution

96. 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

97. If $x = a(\sin\theta - \theta\cos\theta)$ and $y = a(\cos\theta + \theta\sin\theta)$ find dy/dx at θ = $\frac{\pi}{4}$

Watch Video Solution

98. Differntiate $\sin^2(\theta^2 + 1)w.r.t\theta$

Watch Video Solution

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

Watch Video Solution

100. Find $\frac{dy}{dx}$, when $x = a\left(\cos t + \log\left|\frac{\tan t}{2}\right|\right)$ and $y = a\sin t, 0 < t < \frac{\pi}{2}$

Watch Video Solution

101. If $x = e^{\cos 2t}$ and $y = e^{\sin 2t}$, then prove that $\frac{dy}{dx} = \frac{-y \log x}{x \log y}$.

Watch Video Solution

102. If $x = \sqrt{a^{\sin^{-1} t}}$, $y = \sqrt{a^{\cos^{-1} t}}$, show that $\frac{dy}{dx} = -\frac{y}{x}, a > 0$

Watch Video Solution

103. Find $\frac{dy}{dx}$ at $t = \frac{\pi}{4}$ when $xe^{-t}(\sin t + \cos t)$ and $y = e^{-t}(\sin t - \cos t)$

Watch Video Solution

104. 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

105. if $x = \sec\theta - \cos\theta$ and $y = \sec^n\theta - \cos^n\theta$, then show that $(x^2+4)\left(\frac{dy}{dx}\right)^2 = n^2(y^2+4)$

Watch Video Solution

106. Find $\frac{dy}{dx}$ when $y = \sin^{-1}\left(\frac{\sqrt{x}-1}{\sqrt{x}+1}\right) + \sec^{-1}\left(\frac{\sqrt{x}+1}{\sqrt{x}-1}\right)$, x > 1`

Watch Video Solution

107. Differentiate the following functions w.r.t.x

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

110. Differntiate the following functions w.r.t.x

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

Watch Video Solution

111. Differentiate the following functions w.r.t.x $\tan^{-1}(\sin x + \cos x)$

Watch Video Solution

112. Differntiate the following functions w.r.t.x

$$\tan^{-1}\left(\frac{1-\cos x}{\sin x}\right), \quad -\frac{\pi}{2} < x < \frac{\pi}{2}$$

Watch Video Solution

113. Differentiate the following w.r.t.x $\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right)$

Watch Video Solution

114. Differntiate the following functions w.r.t.x $\tan^{-1}\left(\frac{\sin x}{1+\cos x}\right)$

Watch Video Solution

115. Differentiate the following functions w.r.t.x $\tan^{-1}(\sec x + \tan x),\ -\frac{\pi}{2} < x < \frac{\pi}{2}$

Watch Video Solution

116. Differentiate the following functions w.r.t.x $\cos^{-1}\left(\sqrt{\frac{1+x}{2}}\right), |x| < 1$

Watch Video Solution

117. Differentiate the following functions w.r.t.x $\sin^{-1}\left(\frac{2x}{1+x^2}\right), |x| \leq 1$

Watch Video Solution

118. Differntiate the following functions w.r.t.x $\tan^{-1}\left(\frac{\sqrt{1+x}}{2}\right), x \neq 0$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

121. Differntiate the following functions w.r.t.x

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

Watch Video Solution

122. Find $\frac{dy}{dx}$ when: $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$

Watch Video Solution

123. Find $\frac{dy}{dx} when y = \cos^{-1}\left(\frac{3\cos x - 4\sin x}{5}\right)$

Watch Video Solution

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

Watch Video Solution

125. If $y = \tan^{-1}\left(2\frac{x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $f \in d$dy/dx$when$x in (0,1)`

Watch Video Solution

126. If $y = \tan^{-1}\left(2\frac{x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $f \in d$dy/dx$when$x in (0,1)`

Watch Video Solution

127. If $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $f \in d$dy/dx$when$x in (1, infty)`

Watch Video Solution

128. If $y = \tan^{-1}\left(2\frac{x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $f \in d$dy/dx$when$x in (0,1)`

Watch Video Solution

129. If $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, find $\frac{dy}{dx}$ when $x \in (-\infty, -1)$

Watch Video Solution

130. Find the derivative of $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ w.r.t. $\sqrt{1-x^2}$ at $x = \frac{1}{2}$.

Watch Video Solution

131. Differentiate $\sec^{-1}\left(\frac{1}{2x^2-1}\right) w.r.t \sin^{-1}(3x - 4x^3)$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

134. 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

135. If $y=\sin^{-1}\left(\frac{\sin\alpha\sin x}{1-\cos\alpha\sin x}\right)$, find y'(0)

Watch Video Solution

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

$ax^2 + 2hxy + by^2 + 2gx + 2 + y + c = 0$

Watch Video Solution

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

Watch Video Solution

138. Find $\frac{dy}{dx}$ if $\sin(x - y) = 3x$

Watch Video Solution

139. Find $\frac{dy}{dx}$ where

$e^x \log y = \sin^{-1} x + \sin^{-1} y$

Watch Video Solution

140. If y = x sin y, prove that $x\frac{dy}{dx} = \frac{y}{1 - x\cos y}$

Watch Video Solution

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

Watch Video Solution

142. If $y = b\tan^{-1}\left\{\frac{x}{a} + \tan^{-1}\left(\frac{y}{x}\right)\right\}$, find $\frac{dy}{dx}$

Watch Video Solution

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

Watch Video Solution

144. If $\tan^{-1}\left(\frac{x^2-y^2}{x^2+y^2}\right)=a$, $provet\frac{\widehat{dy}}{dx}=x\frac{1-\tan a}{y(1+\tan a)}$

Watch Video Solution

145. If $\sqrt{y+x}+\sqrt{y-x}=a$, then show that $\frac{dy}{dx}=2\frac{x}{a^2}$

Watch Video Solution

146. If $x\sqrt{1+y}+y\sqrt{1+x}=0$ show that $\frac{dy}{dx}=-\frac{1}{(1+x)^2}$

Watch Video Solution

147. If $y\sqrt{1-x^2}+x\sqrt{1-y^2}=1$, then prove that $\frac{dy}{dx}=-\sqrt{\frac{1-y^2}{1-x^2}}$

Watch Video Solution

148. Differentiate the following functions w.r.t. x

$$\frac{e^{x^2}\tan^{-1}x}{\sqrt{1+x^2}}, x>0$$

Watch Video Solution

149. Differentiate the following functions w.r.t. x

$$\left(x\frac{\sqrt{x^2+4}}{(3x+2)^{2/3}}, x>0\right.$$

Watch Video Solution

150. Find $\frac{dy}{dx}$ when$y = x^{\log x} + (\log x)^x, x > 1$

Watch Video Solution

151. If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{\{\log(xe)\}^2}$

Watch Video Solution

152. If $\sqrt{\left(\frac{x}{y}\right)}+\sqrt{\left(\frac{y}{x}\right)}=\lambda$. Where x, y > 0 and λ is a positive constant greater than or equal to 2 , prove that $\frac{dy}{dx}=\frac{y}{x}$

Watch Video Solution

153. Differentiate $\cos(x^x) w.\ r.\ t.\ x$

Watch Video Solution

154. Differentiate the following functions w.r.t.x (x^x) + sinx^logx

Watch Video Solution

155. Differentiate the following functions w.r.t.x

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

Watch Video Solution

156. Differentiate the following functions w.r.t.x

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

Watch Video Solution

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

Watch Video Solution

158. Find $\frac{dy}{dx}$ when $(\cos x)^y = (\cos y)^x$

Watch Video Solution

159. Find $\frac{dy}{dx}$ when $y = 10^{10^x} + 10^{x^x} + 10^{x^{10}}$

Watch Video Solution

160. Find $\frac{dy}{dx}$ when $x^y = y^x$

Watch Video Solution

161. Find $\frac{dy}{dx}$ when $y = 10^{x^{10^x}}$

Watch Video Solution

162. If $y = (\log_{\cos x} \sin x)(\log_{\sin x} \cos x)^{-1} + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, find $\frac{dy}{dx} at x = \frac{\pi}{4}$

Watch Video Solution

163. Verify Rolle's Theorem for the function $f(x) = x^2 + x - 6$ in the interval [-3,2]

Watch Video Solution

164. Verify Rolle's theorem for the function $f(x) = x^3 - 9x^2 + 26x - 24$ in the interval [2,4]

Watch Video Solution

165. Verify Rolle's theorem for the function : $f(x) = x^3 - 4x$ in the interval [-2, 2]`

Watch Video Solution

166. Verify Rolle's Theorem for the function $f(x) = \cos\left\{2\left(x - \frac{\pi}{4}\right)\right\}$ in the interval $\left[0, \frac{\pi}{2}\right]$

Watch Video Solution

167. Verify Rolle's theorem for function $f(x) = e^x \cos x$ in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$.

Watch Video Solution

168. Differentiate the following

$\log(\tan x)$

Watch Video Solution

169. Find the derivative of $\tan 5x + \sin 4x$

Watch Video Solution

170. Verify Lagrange's Mean value Theorem (LMV.) for the function f(x) = x(2-x) in [0,1]`

Watch Video Solution

171. Verify lagrange mean value theorem for the function $f(x) = 2x^2 - 10x + 29$in the interval [2,7]

Watch Video Solution

172. Verify Lagrange's Mean value theorem for the function $f(x) = x^2 + x - 1$ in the interval [0,4]

Watch Video Solution

173. Verify Lagrange's Mean Value Theorem for the function f defined by $f(x) = x^3 + x^2 - 6x$ in the interval [-1,4]

Watch Video Solution

174. Find 'c' of Lagrange's Mean Value Theorem for the functions:

$f(x) = e^x$ in the interval [0,1]

Watch Video Solution

175. Find 'c' of Lagrange's Mean Value Theorem for the functions:

$f(x) = \log x$ in the interval [1,e]

Watch Video Solution

176. 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

177. Does Lagrange's mean value theorem apply to $f(x) = x^{1/3}, \ -1 \leq x \leq 1$. What conclusions can be drawn?

Watch Video Solution

178. Let $f(x)\begin{cases} 2 + x^3 f \text{ or } x \leq 1 \\ 3xf \text{ or } x > 1 \end{cases}$ Verify Lagrange's mean value theorem for the function `f(x) on [-1,2]

Watch Video Solution

EXERCISE

1. Examine the continuity of $f(x) = \begin{cases} \frac{x^2-9}{x-3} & x \neq 3 \\ 6 & x = 3 \end{cases}$ at x = 3`

Watch Video Solution

2. If $f(X) = \frac{x^2-1}{x-1}$ for $x \neq 1$ and f(x) = 2 when x = 1. Show that the function f(X) is continuous at x = 1.

Watch Video Solution

3. The value of the constant k so that the function $f(x) = \begin{cases} \frac{x^2-3x+2}{x-1} & , \text{ if } x \neq 1 \\ k & , \text{ if } x = 1 \end{cases}$ is continuous at x = 1 is

Watch Video Solution

4. The constant k, so that the $f(x) = \begin{cases} \frac{x^2-2x-3}{x+1} & \text{if } x \neq -1 \\ k & \text{if } x = -1 \end{cases}$ is continuous at x = -1 is

Watch Video Solution

5. Examine the function $f(X) = \begin{cases} \frac{1-\cos 3x}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$ for continuity at x = 0

Watch Video Solution

6. For what value of k, function $f(x)$ is continuous at x = 0 where $f(x) = \begin{cases} \frac{1-\cos 4x}{8x^2} \\ k \end{cases}, \begin{pmatrix} x \neq 0 \\ x = 0 \end{pmatrix}$

Watch Video Solution

7. A function f(x) is defined as $f(x) = \begin{cases} \frac{x^2 - x - 6}{x - 3} & x \neq 3 \\ 5 & x = 3 \end{cases}$ show that f(X) is continous at x = 3.

Watch Video Solution

8. Discuss the continuity of the function f(x), where $f(x) = \begin{cases} 2 - x & x < 0 \\ 2 + x & x \geq 0 \end{cases}$, at x = 2,0 and -2.

Watch Video Solution

9. Discuss the continuity of the function $f(x) at x = 0$, where $f(x) = \begin{cases} \left(\frac{|x|}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$

Watch Video Solution

10. Discuss the continuity of the function f(x) at x = 2, where

$$f(x) = \begin{cases} 3x + 5 & \text{if} \quad x \geq 2 \\ x^2 & \text{if} \quad x < 2 \end{cases}$$

Watch Video Solution

11. Discuss continuity of $f(X) = \begin{cases} -1 & x < 0 \\ 2 - x & x \geq 0 \end{cases}$ at x = 0

Watch Video Solution

12. Examine the following functions for continuity:

$$f(x) = \begin{cases} \frac{2x^2 - 3x - 2}{x - 2} & x \neq 2 \\ 3 & x = 2 \end{cases}$$

Watch Video Solution

13. Examine the following functions for continuity:

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

Watch Video Solution

Watch Video Solution

14. Examine the following functions for continuity:

$$f(x) = \begin{cases} \frac{|x-3|}{2(x-3)} & \text{if } x \neq 3 \\ 0 & \text{if } x = 3 \end{cases}$$ at x = 3

Watch Video Solution

15. Examine the following functions for continuity:

$$f(x) = \begin{cases} \frac{x-|x|}{x} & x \neq 0 \\ 2 & x = 0 \end{cases}$$ at x = 0

Watch Video Solution

16. Examine the following functions for continuity:

$$f(x) = \begin{cases} \left(\frac{x^2}{2}\right) & \text{if } 0 \leq x \leq 1 \\ 2x^2 - 3x + \frac{3}{2} & \text{if } 1 < x \leq 2 \end{cases}$$ at x = 1

Watch Video Solution

17. Examine the following functions for continuity:

$f(x) = |x| + |x - 1|$

at x = 1

Watch Video Solution

18. Examine the continuity of the function

$f(x) = \begin{cases} 3x - 2 & x \leq 0 \\ x + 1 & x > 0 \end{cases} at x = 0$

Watch Video Solution

19. Is the function $f(X) = \begin{cases} \frac{1-x^n}{1-x} & x \neq 1 \\ n - 1 & x = 1 \end{cases}$, n $\in$ N continuous at x =1?

Watch Video Solution

20. If $f(x) = \begin{cases} \frac{x}{|x|+2x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$

Prove that $f(x)$ remain discontinous at $x = 0$ for any real value of k.

Watch Video Solution

21. Determine the value of the constant k so that the function

$$f(x) = \begin{cases} \frac{\sin 2x}{5x} & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$$ is continuous at x = 0

Watch Video Solution

22. Determine the value of the constant k so that the function

$$f(x) = \begin{cases} \frac{\sin kx}{x} & x \neq 0 \\ 4 + x & x = 0 \end{cases}$$ is continuous at 0.

Watch Video Solution

23. Determine the value of the constant k so that the function

$$f(x) = \begin{cases} 3x - 8 & \text{if } x \leq 5 \\ 2k & \text{if } x > 5 \end{cases}$$ is continuous at x = 5

Watch Video Solution

24. Determine the value of the constant k so that the function $f(x) = \begin{cases} kx + 1 & \text{if } x \leq \pi \\ \cos x & \text{if } x > \pi \end{cases}$ is continuous at $x = \pi$.

Watch Video Solution

25. Determine the value of the constant k so that the function $f(x) = \begin{cases} kx + 1 & \text{if } x \leq 5 \\ 3x - 5 & \text{if } x > 5 \end{cases}$ is continuous at x = 5.

Watch Video Solution

26. Determine the value of the constant k so that the function $f(x) = \begin{cases} k(x^2 + 2) & \text{if } x \leq 0 \\ 3x + 1 & \text{if } x > 0 \end{cases}$ is continuous at x = 0

Watch Video Solution

27. Determine the value of the constant k so that the function $f(x) = \begin{cases} 2x^2 + k & \text{if } x \geq 0 \\ -2x^2 + 4 & \text{if } x < 0 \end{cases}$ is continuous at x = 0

Watch Video Solution

28. Find the values of a so that the function f defined by $f(X) = \begin{cases} \frac{\sin^2 ax}{x^2} & x \neq 0 \\ 1 & x = 0 \end{cases}$ may be continuous at x = 0.

Watch Video Solution

29. Find the value of a if the function f defined by $f(x) = \begin{cases} 2x - 1 & x < 2 \\ a & x = 2 \\ x + 1 & x > 2 \end{cases}$ is continuous at x = 2.

Watch Video Solution

30. Show that the function f(x) = |x + 1| + | x - 1| is continuous at x = -1 , x = 1

Watch Video Solution

31. Consider the functions defined as follows, for $x \neq 0$. In each case, what choice (if any) of f (0) will make it continuous at x = 0?

$$f(x) = \frac{3x + 4\tan x}{x}$$

Watch Video Solution

32. Consider the functions defined as follows, for $x \neq 0$. In each case, what choice (if any) of f (0) will make it continuous at x = 0?

$$f(x) = \frac{3x + 4\tan x}{x}$$

A. Consider the functions defined as follows, for $x \neq 0$. In each case, what choice (if any) of f (0) will make it continuous at x = 0?

$$f(x) = \frac{3x + 4\tan x}{x}$$

B.

C.

D.

Watch Video Solution

33. Find a $\in$ R so that $f(x) = \begin{cases} x^2 & x \geq 0 \\ ax & x < 0 \end{cases}$ is continuous at 0.

Watch Video Solution

34. Find $k \in R$ if $f(x) = \begin{cases} \frac{\cos^2 x - \sin^2 x - 1}{\sqrt{x^2+1}-1} & x \neq 0 \\ k & x = 0 \end{cases}$ is continuous at 0.

Watch Video Solution

35. Let $f(x) = \begin{cases} \frac{1-\cos ax}{x \sin x} & x \neq 0 \\ \frac{1}{2} & \text{if} \quad x = 0 \end{cases}$ If f is continuous at x=0, find a.

Watch Video Solution

36. Find the value of the constant k so that function

$f(x) = \begin{cases} \frac{k \cos x}{\pi - 2\pi} & \text{if} x \neq \frac{\pi}{2} \\ 3 & \text{if} \quad x = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$

Watch Video Solution

37. Examine the following functions for continuity:

$$f(x) = \begin{cases} x^n \frac{\sin 1}{x} & x \neq 0 \\ - & x = 0 \end{cases}$$ at x = 0, where n $\geq$ 1.

Watch Video Solution

38. Examine the following functions for continuity:

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

Watch Video Solution

39. Examine the following functions for continuity:

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

Watch Video Solution

40. Examine the following functions for continuity:

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

Watch Video Solution

41. 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

Watch Video Solution

42. Find f(0) if the function defined as $f(x) = \begin{cases} \frac{\log\left(1 + \frac{x}{a}\right) - \log\left(1 - \frac{x}{b}\right)}{x} (f \text{ or } x \neq 0), \end{cases}$ is continuous at x = 0. $ab \neq 0$

Watch Video Solution

43. For what value of λ is the function defined by $f(x) = \{\lambda(x^2 - 2x), \quad \text{if} \quad x \leq 0, 4x + 1, \quad \text{if} \quad x > 0\}$ continuous at x = 0? What about continuity at x = 1?

Watch Video Solution

44. 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

45. Show that the function f(x) = |sin x + cos x | is continuous at x = π.

Watch Video Solution

46. Extend the defination of the function $f(x) = \frac{1 - \cos[7(x - \pi)]}{5(x - \pi)^2}, x \neq \pi$ by continuity at $x = \pi$

Watch Video Solution

47. Let $f(x) = \begin{cases} 4x - 3 & \text{if } x < 0 \\ 4x + 3 & \text{if } x \geq 0 \end{cases}$. Is it a continuous function? Justify your answer.

Watch Video Solution

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

Watch Video Solution

49. Prove that the following functions are continuous:

cot x

Watch Video Solution

50. Prove that the following functions are continuous:

sec x

Watch Video Solution

51. Prove that the following functions are continuous:

$\sin^{-1} x$

Watch Video Solution

52. Prove that the function f defined by $f(x) = x^3 + x^2 - 1$ is a continuous function at x= 1.

Watch Video Solution

53. Prove that the following functions are continuous:

$|x+1|+|x|$

Watch Video Solution

54. Prove that the following functions are continuous:

sin |x|

Watch Video Solution

55. Prove that the following functions are continuous:

|sin x|

Watch Video Solution

56. Prove that the following functions are continuous:

|cos x|

Watch Video Solution

57. Prove that the following functions are continuous:

$\cos x^2$

Watch Video Solution

58. Show that the following functions are continuous:

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

Watch Video Solution

59. Prove that the following functions are continuous:

$e^{\cos x}$

Watch Video Solution

60. Prove that the following functions are continuous:

$e^x(\tan x)$

Watch Video Solution

61. Prove that the following functions are continuous:

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

Watch Video Solution

62. If $f(x)=\frac{|x-4|}{4-x}, x \neq 4, f(4)=0$, show that f is continuous every where except at x = 4.

Watch Video Solution

63. Examine for continuity the following functions:

$$f(x)=\begin{matrix} x & \text{if} \quad x \neq 0 \\ 1 & \text{if} \quad x=0 \end{matrix}$$

Watch Video Solution

64. Examine for continuity the following functions:

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

Watch Video Solution

65. Examine for continuity the following functions:

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

Watch Video Solution

66. Examine for continuity the following functions:

$$f(x) = \begin{cases} 2x - 1 & \text{if } x < 2 \\ \frac{3}{2}x & \text{if } x \geq 2 \end{cases}$$

Watch Video Solution

67. Examine for continuity the following functions:

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

Watch Video Solution

68. Examine for continuity the following functions:

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

Watch Video Solution

69. Examine for continuity the following functions:

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

Watch Video Solution

70. Locate the points of discontinuity of the function:

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

Watch Video Solution

71. Locate the points of discontinuity of the following functions:

$$f(x) = \begin{cases} x^3 - x^2 + 2x - 2 & x \neq 1 \\ 4 & x = 1 \end{cases}$$

Watch Video Solution

72. Determine the constant k(if it exists), so that the following functions may be continuous:

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

Watch Video Solution

73. Determine the constant k(if it exists), so that the following functions may be continuous:

$$f(x) = \begin{cases} k(x^2 - 2x) & x < 0 \\ \cos x & x \geq 0 \end{cases}$$

Watch Video Solution

74. For what choice of a and b are the following functions continuous?

$$f(x) = \begin{cases} ax^2 + b & x > 2 \\ 2 & x = 2 \\ 2ax - b & x < 2 \end{cases}$$

Watch Video Solution

75. 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

76. For what choice of a and b are the following functions continuous?

$$f(x) = \begin{cases} x^2 & x \leq 0 \\ ax + b & x > 0 \end{cases}$$

Watch Video Solution

77. Examine for continuity the function : $f(x) = \begin{cases} \sin^{-1}|x| & x \neq 0 \\ 0 & x = 0 \end{cases}$ at x = 0

Watch Video Solution

78. Let $f(x) = \begin{cases} 1 & x \leq -1 \\ \lambda x + \mu & -1 < x < 3 \\ 5 & x \geq 3 \end{cases}$ find λ and μ if f is a continuous function.

Watch Video Solution

79. Examine the function [1-x]+[x-1] for continuity at x = 1.

Watch Video Solution

80. Find the domain of continuity of the following functions:

$$f(x) = \frac{\sin^{-1} x}{[x]}$$

Watch Video Solution

81. Find the domain of the following functions:

$$f(x) = \log(1 - x) + \sqrt{x^2 - 1}$$

Watch Video Solution

82. Find the domain of continuity of the following functions:

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

Watch Video Solution

83. Find the domain of continuity of the following functions:

`f(x) = | 2 - 3x + |x| |.

Watch Video Solution

84. Given the function $f(x) = \frac{1}{x+2}$. Find the points of discontinuity of te composite function $y = f(f(x))$

Watch Video Solution

85. Find all the points of discontinuity of the function $f(t) = \left(\frac{1}{t^2+t-2}\right)$, where t $= \frac{1}{x-1}$

Watch Video Solution

86. Examine the following functions for continuity:

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

Watch Video Solution

87. Examine for continuity and differentiability, each of the following functions:

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

Watch Video Solution

88. Examine for continuity, each of the following functions:

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

Watch Video Solution

89. Examine for continuity and differentiability, each of the following functions:

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

Watch Video Solution

90. Examine for continuity and differntiability, each of the following functions:

$$f(x) = \begin{cases} 1+x & x \leq 0 \\ 1-x & x > 0 \end{cases} atx = 0$$

Watch Video Solution

91. Examine for continuity the following functions:

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

Watch Video Solution

92. Let f(x) = x+ |x|. Show that f is continuous but not derivable at x = 0

Watch Video Solution

93. Show that the function $f(x) = \begin{cases} -x^2 & x \leq 0 \\ x^2 & x > 0 \end{cases}$ is continuous at $x = 0$. Also show that f is differentiable at $x = 0$.

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. Find a $\in$ R so that $f(x) = \begin{cases} x^2 & x \geq 0 \\ ax & x < 0 \end{cases}$ is continuous at 0.

Watch Video Solution

96. 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

97. 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

98. If f(x) = e^x, find f' (3) starting from defination

Watch Video Solution

99. If f(x) = $e^{\sqrt{x}}$ find f' (x) .

Watch Video Solution

100. A function $f: R \to R$ satisfies the equation $f(x+y) = f(x).f(y)$ for all x, y in R and f(x) $\neq$ 0 for any x in R. Let the function be differentiable at x = 0 and f'(0) = 2 Show that f'(x) = 2 f(x) for all x in R. Hence, determine f(x).

Watch Video Solution

101. If f(x) = log (2x-1), find f'(c) .

Watch Video Solution

102. If $f(x) = \begin{cases} x\left(\frac{e^{1/x}-e^{-1/x}}{e^{1/x}+e^{-1/x}}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$, then at x = 0 f(x) is

Watch Video Solution

103. Find f'(X) using first prinicples when $f(x) = e^{3x-2}$

Watch Video Solution

104. Find f'(X) using first prinicples when $f(x) = \log(2x + 3)$

Watch Video Solution

105. Find derivative of each of the following functions:

$e^x + \log x$

Watch Video Solution

106. Find derivative of each of the following functions:

$x^2 \log x$

Watch Video Solution

107. Find derivative of each of the following functions:

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

Watch Video Solution

108. Find derivative of each of the following functions:

$$\frac{e^x}{1+x^2}$$

Watch Video Solution

109. Find derivative of each of the following functions:

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

Watch Video Solution

110. Find derivative of each of the following functions:

$$\frac{e^x \log x}{x^2}$$

Watch Video Solution

111. Find derivative of each of the following functions:

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

Watch Video Solution

112. Find derivative of each of the following functions:

$$\frac{e^x+\sin x}{1+\log x}$$

Watch Video Solution

113. Find derivative of each of the following functions:

$$xe^x \sin x$$

Watch Video Solution

114. Find derivative of each of the following functions:

$x^2 \log x \cos x$

Watch Video Solution

115. Find $\frac{dy}{dx}$ when $y = \sin u, u = e^{\sqrt{t}}$ and $t = \log x$

Watch Video Solution

116. Find the derivatives of the following functions at any point of their domains:

$\sec(3x + 3)$

Watch Video Solution

117. Find the derivatives of the following functions at any point of their domains:

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

Watch Video Solution

118. Find the derivatives of the following functions at any point of their domains:

$\cos x^2$

Watch Video Solution

119. Find the derivatives of the following functions at any point of their domains:

$\cos(\log x)$

Watch Video Solution

120. Find the derivatives of the following functions at any point of their domains:

$e^{\cos x+2}$

Watch Video Solution

121. Find the derivatives of the following functions at any point of their domains:

e^{x^2}

Watch Video Solution

122. Find the derivatives of the following functions at any point of their domains:

$\log|\sin x|$

Watch Video Solution

123. Find the derivatives of the following functions at any point of their domains:

$\sqrt{1+\tan x}$

Watch Video Solution

124. Find the derivatives of the following functions at any point of their domains:

$\cos\left(1-x^2\right)^2$

Watch Video Solution

125. Find the derivatives of the following functions at any point of their domains:

$\sqrt{\frac{1+x}{1-x}}$

Watch Video Solution

126. Find the derivatives of the following functions at any point of their domains:

$e^x \cot x$

Watch Video Solution

127. Find the derivatives of the following functions at any point of their domains:

$\sin^2(ax^2 + bx + c), n \neq -1$

Watch Video Solution

128. Find the derivatives of the following functions at any point of their domains:

$2^{\cos^2 x}$

Watch Video Solution

129. Find the derivatives of the following functions at any point of their domains:

$\sin \sqrt{x} + \cos^2 \sqrt{x}$

Watch Video Solution

130. Find the derivatives of the following functions at any point of their domains:

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

Watch Video Solution

131. Differentiate the following functions w.r.t.x :

$$\frac{x^3 - 8}{(x+2)^3}$$

Watch Video Solution

132. Differentiate the following functions w.r.t.x :

$\sin 2x \cos 3x$

Watch Video Solution

133. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

134. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

135. Differentiate the following functions w.r.t.x :

$$\frac{\sin 2x}{e^x}$$

Watch Video Solution

136. Differentiate the following functions w.r.t.x :

$$\frac{x}{\sin 3x}$$

Watch Video Solution

137. Differentiate the following functions w.r.t.x :

$$\frac{e^x + \log x}{\sin 3x}$$

Watch Video Solution

138. Differentiate the following functions w.r.t.x :

$$\frac{\sin x + x^2}{\cot 2x}$$

Watch Video Solution

139. Differentiate the following functions w.r.t.x.

$$\frac{1 - \cos x}{1 + \cos x}$$

Watch Video Solution

140. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

141. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

142. Differentiate the following functions w.r.t.x :

$$\frac{\sin x}{\sqrt{\cos x}}$$

Watch Video Solution

143. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

144. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

145. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

146. Differentiate the following functions w.r.t.x :

$\tan^2\left(\sqrt{x^4 + 3}\right)$

Watch Video Solution

147. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

148. Differentiate the following functions w.r.t.x :

$$\sqrt{\left(\log\left(\sin\left(\frac{x^2}{3}-1\right)\right)\right)}$$

Watch Video Solution

149. Differentiate the following functions w.r.t.x :

$$\log\sqrt{\frac{1-\sin x}{1+\sin x}}$$

Watch Video Solution

150. Differentiate the following functions w.r.t.x :

$\sin(\log(\log 3x)$

Watch Video Solution

151. Differentiate the following functions w.r.t.x :

$\sqrt{\tan\sqrt{x}}$

Watch Video Solution

152. Differentiate the following function w.r.t x

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

Watch Video Solution

153. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

154. Differentiate the following functions :

$\sin^P x \cos^q x$

Watch Video Solution

155. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

156. Differentiate the following functions w.r.t.x :

$$\frac{e^{2x} - 1}{e^{2x} + 1}$$

Watch Video Solution

157. Differentiate the following functions w.r.t.x :

$$\frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}}$$

Watch Video Solution

158. Differentiate the following functions w.r.t.x :

$$\left(\frac{2x^3 + 1}{3x^2 + 1}\right)^2$$

Watch Video Solution

159. Differentiate the following functions w.r.t.x :

$$\frac{x}{a - \sqrt{a^2 - x^2}}$$

Watch Video Solution

160. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

161. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

162. Differentiate the following functions w.r.t.x :

$$\sqrt{\sin\sqrt{x}}$$

Watch Video Solution

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

$$\sin(e^x \log x)$$

Watch Video Solution

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

$x \log x + \log(\log x)$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

$\log\left(\log\left(\log x^5\right)\right)$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

$(\log x)e^{\tan x + x^2}$

Watch Video Solution

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

$e^{\sin x}\sin(e^x)$

Watch Video Solution

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

$\sqrt{\frac{1+e^x}{1-e^x}}$

Watch Video Solution

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

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

Watch Video Solution

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

$\sin x^2 + \sin^2 x + \sin^2 x^2$

Watch Video Solution

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

$\sqrt{\sec^2 x + \cos ec^2 x}$

Watch Video Solution

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

$2^x e^{2(x+3)}$

Watch Video Solution

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

$2^{5x^2} \times 3^{-4x}$

Watch Video Solution

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

$\log\left|\frac{a+b\sin x}{a-b\sin x}\right|$

Watch Video Solution

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

$(5x)^{3\cos^2 x}$

Watch Video Solution

182. If $y = \sin\left(\cos\sqrt{a}x + b\right)$, find $\frac{dy}{dx}$

Watch Video Solution

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

Watch Video Solution

184. If $y = \sqrt{\frac{1-\sin 2x}{1+\sin 2x}}$, prove that $\frac{dy}{dx} + \sec^2\left(\frac{\pi}{4} - x\right) = 0, 0 \leq x \leq \frac{\pi}{4}$

Watch Video Solution

185. If $y = e^{x+3\log x}$ prove that $\frac{dy}{dx} = x^2(x+3)e^x$

Watch Video Solution

186. If $y = \frac{e^x + e^{-x}}{e^x - e^{-x}}$, then show that $\left(\frac{dy}{dx}\right) = 1 - y^2$

Watch Video Solution

187. Find the derivatives of the following functions at the indicated points.

$\cos\left(2x + \frac{\pi}{2}\right) at x = \frac{\pi}{3}$

Watch Video Solution

188. Find the derivatives of the following functions at the indicated points.

$\frac{1 + \sin x}{1 + \cos x} at x = \frac{\pi}{2}$

Watch Video Solution

189. Find the derivatives of the following functions at the indicated points.

$\cot x + \sec^2 x - 5atx = \frac{\pi}{6}$

Watch Video Solution

190. Find the derivatives of the following functions at the indicated points.

$9\sin x + sin3x$

at $x = \frac{\pi}{3}$

Watch Video Solution

191. Find the derivatives of the following functions at the indicated points.

$\left(\cos ec^2 x + \tan x + \cot x\right)^7 atx = \frac{\pi}{4}$

Watch Video Solution

192. Find the derivatives of the following functions at the indicated points.

$\sqrt{\sin^4 x^2 + \cos^4 x^2}$ at $x = \left(\sqrt{\frac{\pi}{2}}\right)$

Watch Video Solution

193. Find $\frac{dy}{dx}$ when $x = t + \frac{1}{t}, y = t - \frac{1}{t}$

Watch Video Solution

194. 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

195. Find $\frac{dy}{dx}$ when $x = a\sin^2 t, y = b\cos^2 t$

Watch Video Solution

196. Find $\frac{dy}{dx}$ when $x = e^{t-\sin t}, y = e^{t+\cos t}$

Watch Video Solution

197. Find $\frac{dy}{dx}$ when $x = a\cos^3 t, y = b\sin^3 t$

Watch Video Solution

198. Find $\frac{dy}{dx}$ when $x = e^t(\sin t + \cos t), y = e^t(\sin t - \cos t)$

Watch Video Solution

199. Find $\frac{dy}{dx}$ when $x = \cos\theta + \cos 2\theta, y = \sin\theta + \sin 2\theta)$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

202. Find $\frac{dy}{dx} att = \frac{\pi}{4}$, when $x = 2\cos 2t$ and $y = 2\sin t - \sin 2t$

Watch Video Solution

203. If $x = a\sec^3\theta and y = a\tan^3\theta, f \in d\frac{dy}{dx}\theta = \frac{\pi}{3}.$

Watch Video Solution

204. Find $\frac{dy}{dx}$ at t = 2 when

$x = \frac{2bt}{1+t^2}$ and $y = \frac{a(1-t^2)}{1+t^2}$

Watch Video Solution

205. Find $\frac{dy}{dx} when$x = 2t/(1+ t^2) and y = (1- t^2)/(1+ t^2)`

Watch Video Solution

206. Differentiate the following functions:

$\sin x^3 w.\, r.\, t.\, x^3$

Watch Video Solution

207. Differentiate the following functions:

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

Watch Video Solution

208. Differentiate the following functions:

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

Watch Video Solution

209. Differentiate the following functions:

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

Watch Video Solution

210. Differentiate the following functions:

$\cot^3(2x+1) w.\ r.\ t.\ x^2+1$

Watch Video Solution

211. Differentiate the following functions:

$\frac{x}{\sin x}$ w.r.t $\sin x$.

Watch Video Solution

212. 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

213. If $x = 3\cos t - 2\cos^3 t$ and $y = 3\sin t - 2\sin^3 t,$ show that $\frac{dy}{dx} = \cot t$

Watch Video Solution

214. Find $\frac{dy}{dx}$ if $x = \frac{\sin^3 t}{\sqrt{\cos 2t}}, y = \frac{\cos^3 t}{\sqrt{\cos 2t}}$

Watch Video Solution

215. Find $\frac{dy}{dx}$ if $3y = \sqrt{\sec^2 x - 1}$

Watch Video Solution

216. Differentiate the following functions w.r.t.x $\sin^{-1} 3x$

Watch Video Solution

217. Differentiate the following functions w.r.t.x $\sin^{-1} \sqrt{x}$

Watch Video Solution

218. Differentiate the following functions w.r.t.x $\cos^{-1}(1-x)$

Watch Video Solution

219. Differentiate the following functions w.r.t.x $\sin^{-1}(\cos x)$

Watch Video Solution

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

Watch Video Solution

221. Differentiate the following functions w.r.t.x $\left(\cot^{-1} x\right)^2$

Watch Video Solution

222. Differentiate the following functions w.r.t.x $e^{\sin^{-1}(x+1)}$

Watch Video Solution

223. Differentiate the following functions w.r.t.x $\frac{1}{\sqrt{2}}\cot^{-1}\left(\frac{\sqrt{2}}{x}\right)$

Watch Video Solution

224. Differentiate the following functions w.r.t.x $\sqrt{\sin^{-1} 2x}$

Watch Video Solution

225. Differentiate the following functions w.r.t.x $x \cos^{-1} \sqrt{x}$

Watch Video Solution

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

Watch Video Solution

227. Differentiate the following functions w.r.t.x $\sec\left(\tan^{-1} x\right)$

Watch Video Solution

228. Differentiate the following functions w.r.t.x $x \tan^{-1} x$

Watch Video Solution

229. Differentiate the following functions w.r.t.x $\frac{\sin^{-1} x}{x}$

Watch Video Solution

230. Differentiate the following functions w.r.t.x

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

Watch Video Solution

231. Differentiate the following functions w.r.t.x $\sec^{-1}\left(\frac{1}{x-1}\right)$

Watch Video Solution

232. Differentiate the following functions w.r.t.x

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

Watch Video Solution

233. Differentiate the following functions w.r.t.x

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

Watch Video Solution

234. Differentiate the following functions w.r.t.x

$$\cos^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right), \frac{\pi}{4}<x<\frac{\pi}{4}$$

Watch Video Solution

235. Prove that $\cos^{-1}x=\frac{\pi}{2}-\sin^{-1}x$ for $-1\leq x\leq 1$ and use this result to find $\frac{d}{dx}\left(\cos^{-1}x\right)$

Watch Video Solution

236. Prove that $\sec^{-1}x=\cos^{-1}\left(\frac{1}{x}\right)$ and use this to find $\frac{d}{dx}\left(\sec^{-1}x\right)$

Watch Video Solution

Watch Video Solution

237. Prove that $\cot^{-1} x = \frac{\pi}{2} - \tan^{-1} x$ and use this to find the derivative of $\cot^{-1} x$.

Watch Video Solution

238. Prove that

$$\tan\left(\sin^{-1} x\right) = \left(\frac{x}{\sqrt{1} - x^2}\right), 1x1 < 1$$

Watch Video Solution

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

Watch Video Solution

240. Differentiate the following functions w.r.t.x

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

Watch Video Solution

241. Differentiate the following functions w.r.t.x

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

Watch Video Solution

242. Differentiate the following functions w.r.t.x L

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

Watch Video Solution

243. Differentiate the following functions w.r.t.x:

$$\cot^{-1}(\operatorname{cosec} x + \cot x)$$

Watch Video Solution

244. Differentiate the following functions w.r.t.x L

$$4\tan^{-1}\left(\sqrt{\frac{1+\cos 2x}{1-\cos 2x}}\right)$$

Watch Video Solution

245. Differentiate the following functions w.r.t.x

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

Watch Video Solution

246. Differentiate the following functions w.r.t.x L

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

Watch Video Solution

247. Differentiate the following functions w.r.t.x L

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

Watch Video Solution

248. Differentiate the following functions w.r.t.x

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

Watch Video Solution

249. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

250. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

251. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

$\sin^{-1}(3x - 4x^3)$

Watch Video Solution

252. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

253. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

254. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

255. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

256. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

257. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

258. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

259. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

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

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

Watch Video Solution

261. Differentiate the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

262. Differentiate the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

263. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

264. Differentiative the following (by suitable substitutions, if valid), w.r.t.x

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

Watch Video Solution

265. 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

266. 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

267. 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

268. Find $\frac{dy}{dx}$ when $y = \tan^{-1}\left(\frac{4\sqrt{x}}{1-4\times}\right)$

Watch Video Solution

269. Find $\frac{dy}{dx}$ when $y = \tan^{-1}\left(\frac{\sqrt{x}-\sqrt{a}}{1+\sqrt{a}x}\right)$

Watch Video Solution

270. Find $\frac{dy}{dx}$ when $\tan^{-1}\left(\frac{\sqrt{x}(3-x)}{1-3x}\right)$

Watch Video Solution

271. Find $\frac{dy}{dx}$, if $y = \tan^{-1}\left(\frac{x^{\frac{1}{3}} + a^{\frac{1}{3}}}{1 - x^{\frac{1}{3}}a^{\frac{1}{3}}}\right)$

Watch Video Solution

272. Find $\frac{dy}{dx}$ when $y = \cos^{-1}(2x) + 2\cos^{-1}\sqrt{1 - 4x^2}$

Watch Video Solution

273. Differentiate the following functions w.r.t.x :

$\tan^{-1}\left(\frac{a + bx}{b - ax}\right), \frac{bx}{a} > -1$

Watch Video Solution

274. Differentiate the following functions w.r.t.x :

$\tan^{-1}\left(\frac{3 - 2x}{1 + 6x}\right)$

Watch Video Solution

275. Differentiate the following functions w.r.t.x :

$$\cot^{-1}\left(\frac{3-2\tan x}{2+3\tan x}\right), 0 < \tan x < \frac{2}{3}$$

Watch Video Solution

276. Differentiate the following functions w.r.t.x :

$$\tan^{-1}\left(\frac{5ax}{a^2-6x^2}\right), a > 06x^2 < a^2$$

Watch Video Solution

277. If $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right) + \sec^{-1}\left(\frac{1+x^2}{1-x^2}\right)$, prove that $\frac{dy}{dx} = \frac{4}{1+x^2}$, 0 < x < 1

Watch Video Solution

278. If $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right) + \sec^{-1}\left(\frac{1+x^2}{1+x^2}\right)$, find $\frac{dy}{dx}$

Watch Video Solution

279. Find $\frac{dy}{dx}$ when $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ when $x \in (0, 1)$

Watch Video Solution

280. Find $\frac{dy}{dx}$ when $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ when $x \in (0, 1)$

Watch Video Solution

281. Find $\frac{dy}{dx}$ when $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ when $x \in (0, 1)$

Watch Video Solution

282. Find $\frac{dy}{dx}$ when $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ when $x \in (0, 1)$

Watch Video Solution

283. If $y = 2\tan^{-1}\left(\sqrt{\frac{x-a}{b-x}}\right)$ and a < x < b, then show that $\left(\frac{dy}{dx}\right)^2 + \frac{1}{(x-a)(x-b)} = 0$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

289. Find $\frac{dy}{dx}$ when

$$y=\sin^{-1}\left(\frac{1}{\sqrt{1+x^2}}\right)+\frac{\tan^{-1}\left(\sqrt{1+x^2}-1\right)}{x}\Bigg), x>0$$

Watch Video Solution

290. If $y = \sin^{-1} x^2\sqrt{1-x^2} + x\sqrt{1-x^4}$, show that $\frac{dy}{dx} - \frac{2x}{\sqrt{1-x^4}} = \frac{1}{\sqrt{1-x^2}}$

Watch Video Solution

291. 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

292. If $y = \frac{2}{\sqrt{a^2-b^2}}\tan^{-1}\left(\sqrt{\frac{a+b}{a-b}}\ \tan\ \frac{x}{2}\right)$, prove that $\frac{dy}{dx} = \frac{1}{a - b\cos x}$

Watch Video Solution

293. Find $\frac{dy}{dx}$ when $xy = c^2$

Watch Video Solution

294. Find $\frac{dy}{dx}$ when $x^2 + y^2 = a^2$

Watch Video Solution

295. Find $\frac{dy}{dx}$ when $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

Watch Video Solution

296. Find $\frac{dy}{dx}$ when $2x^2 - 3xy + 4y^2 = 5$

Watch Video Solution

297. Find $\frac{dy}{dx}$ when $xy^2 - x^2y = 4$

Watch Video Solution

298. Find $\frac{dy}{dx}$ when $xy^3 - x^3y = y$

Watch Video Solution

299. Find $\frac{dy}{dx}$ when $\left(x^2 + y^2\right)\Big)^2 = xy$

Watch Video Solution

300. Find $\frac{dy}{dx}$ when $\sin(x + y) = \frac{1}{2}$

Watch Video Solution

301. Find $\frac{dy}{dx}$ when $ax^2 + 2hxy + by^2 = c^2$

Watch Video Solution

302. Find $\frac{dy}{dx}$ when $xy^3 - x^3y = x$

Watch Video Solution

303. Find $\frac{dy}{dx}$ if $x^3 + x^2y + xy^2 + y^3 = 81$

Watch Video Solution

304. If $x^{2/3} + y^{2/3} = 2$, find $\frac{dy}{dx}$ at (1,1)

Watch Video Solution

305. Use implicit differentation to verify that $\frac{dy}{dx}.\frac{dx}{dy} = 1$ when $y^2 = 4ax$

Watch Video Solution

306. Use implicit differentation to verify that $\frac{dy}{dx}.\frac{dx}{dy} = 1$ when $x^3 + y^3 = 3axy.$

Watch Video Solution

307. Find $\frac{dy}{dx}$ when $\cos(x+y) = y\sin x$

Watch Video Solution

308. Find $\frac{dy}{dx}$ when $x\sin 2y = y\cos 2x$

Watch Video Solution

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

$y\sec x + \tan x + x^2 y = 0$

Watch Video Solution

310. Find $\frac{dy}{dx}$ when $y^2\sin x + y\tan x + \left(1+x^2\right)\cos x = 0$

Watch Video Solution

311. Find $\frac{dy}{dx}$ when $ye^{x^2} + \tan x + \log(\sin x) = 0$

Watch Video Solution

312. Find $\frac{dy}{dx}$ when $x \sin y + x^3 = \tan^{-1} y$

Watch Video Solution

313. Find $\frac{dy}{dx}$ when $\sin y = \log_{\sin x}(\cos x)$

Watch Video Solution

314. Find $\frac{dy}{dx}$ when $\tan(x + y) + \tan(x - y) = 1$

Watch Video Solution

315. Find $\frac{dy}{dx}$ when $\cot(y) + xy = y$

Watch Video Solution

316. Find $\frac{dy}{dx}$, if $\sin^2 x + \cos^2 y = 1$

Watch Video Solution

317. Find $\frac{dy}{dx}$ when $\sec(x + y) = xy$

Watch Video Solution

318. Find $\frac{dy}{dx}$ when $\tan^{-1}\left(x^2 + y^2\right) = a$

Watch Video Solution

319. If $y = \sqrt{1 + \sqrt{1 + x^4}}$, prove that $y\left(y^2 - 1\right)\frac{dy}{dx} = x^3$

Watch Video Solution

320. 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

321. If $e^x + e^y = e^{x+y}$, prove that $\frac{dy}{dx} = -e^{y-x}$

Watch Video Solution

322. If $\cos^{-1}\left(\frac{x^2-y^2}{x^2-y^2}\right) = \tan^{-1} a$, then prove that $\frac{dy}{dx} = \frac{y}{x}$.

Watch Video Solution

323. If $x^2 + y^2 = t + \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then show that $\frac{dy}{dx} = -\frac{1}{x^3 y}$

Watch Video Solution

324. If $\log\sqrt{x^2+y^2}=\tan^{-1}(y/x)$, then show that $\frac{dy}{dx}=\frac{x+y}{x-y}$

Watch Video Solution

325. If $\sqrt{x^2+1}y=\log\left(\sqrt{x^2+1}-x\right)$, then show that $\left(x^2+1\right)\frac{dy}{dx}+xy+1=0$

Watch Video Solution

326. If $\sqrt{1-x^2}+\sqrt{1-y^2}=a(x-y)$, show that $\frac{dy}{dx}=\sqrt{\frac{1-y^2}{1-x^2}}$

Watch Video Solution

327. 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

328. If $y=\sqrt{x+\sqrt{x+\sqrt{x+\ldots\ldots\infty}}}$, show that $(2y-1)\frac{dy}{dx}=1$

Watch Video Solution

329. $y=\sqrt{\tan x+\sqrt{\tan x+\sqrt{\tan x+\ldots .\text{ to}\infty}}}$ prove that $(2y-1)\frac{dy}{dx}=\sec^2 x$.`

Watch Video Solution

330. Differentiate the following functions w.r.t.x : $(x+1)^2(x+2)^3(x+3)^4$

Watch Video Solution

Watch Video Solution

331. Differentiate the following functions w.r.t.x :

$\sqrt{(x-1)(x-2)(x-3)(x+4)}$

Watch Video Solution

332. Differentiate the following functions w.r.t.x : $e^x \cos^3 x \sin^4 x$

Watch Video Solution

333. Differentiate the following functions w.r.t.x : $x^2 e^x \sin x$

Watch Video Solution

334. Differentiate the following functions w.r.t.x :

$(2x+1)^{1/2}(3x+2)^{2/3}(4x+5)^{3/4}$

Watch Video Solution

335. Differentiate the following functions w.r.t.x : $e^x \cos^3 x \sin^4 x$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

338. Find $\frac{dy}{dx}$ when $x^y + y^x = a^b$

Watch Video Solution

339. Find $\frac{dy}{dx}$ when $x^y = 1$

Watch Video Solution

340. Find $\frac{dy}{dx}$ when $xy = e^{x-y}$

Watch Video Solution

341. Differentiate the following functions w.r.t.x :

x^x

Watch Video Solution

342. Differentiate the following functions w.r.t.x :

$(\sin x)^x$

Watch Video Solution

343. Differentiate the following functions w.r.t.x :

$(2x + 3)^{x-5}$

Watch Video Solution

344. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

345. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

346. Differentiate the following functions w.r.t.x :

$(x^x)^x$

Watch Video Solution

347. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

348. Differentiate the following functions w.r.t.x :

$(\sin x)^x + (x \log x)$

Watch Video Solution

349. Differentiate the following functions w.r.t.x :

$x^{\tan x} + \sqrt{\frac{x^2+1}{2}}$

Watch Video Solution

350. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

351. If $x = e^{x/y}$, prove that $\frac{dy}{dx} = \frac{x - y}{x \log x}$

Watch Video Solution

352. 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

353. If $x^p . y^q = (x + y)^{p+q}$, show that $\frac{dy}{dx} = \frac{y}{x}$;

Watch Video Solution

354. If $y = x^{x^{x^{\cdots \cdots To\infty}}}$, prove that $\frac{dy}{dx} = \frac{y^2}{x(1 - y\log x)}$.

Watch Video Solution

355. Differentiate $(\sin x)^x + (\cos x)^{\sin x}$ w.r.t. x.

Watch Video Solution

356. Differentiate the following functions w.r.t.x $x^x + x^{1/x}$

Watch Video Solution

357. Differentiate the following functions w.r.t.x $x^{\sin x} + (\sin x)^x$

Watch Video Solution

358. Differentiate the following functions w.r.t.x $(\sin x)^{\cos x} - x^{1/x}$

Watch Video Solution

359. Differentiate the following functions w.r.t.x $\sin(x^x) + (\sin x)^x$

Watch Video Solution

360. Differentiate the following functions w.r.t.x $x^{\tan x} + (\tan x)^{\sin x}$

Watch Video Solution

361. Differentiate the following functions w.r.t.x :

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

Watch Video Solution

362. Differentiate the following functions w.r.t.x $(x\cos x)^x + (x\sin x)^{\frac{1}{x}}$

Watch Video Solution

363. Differentiate $(x^x)^x$ w.r.t.x .

Watch Video Solution

364. Find $\frac{dy}{dx} when y = 10x^x + x^{x^x} + (x^{10})$

Watch Video Solution

365. Find $\frac{dy}{dx} when y = e^{e^{e^x}} + e^{x^{e^x}} + e^{e^{x^x}}$

Watch Video Solution

366. Find $\frac{dy}{dx}$ when $(\sin x)^y = (\sin y)^x$

Watch Video Solution

367. Find $\frac{d^2y}{dx^2}$ when $y = 2x^3 + 3x^2 + 6$

Watch Video Solution

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

Watch Video Solution

369. Find $\frac{d^2y}{dx^2}$ when $y = x^x$

Watch Video Solution

370. Find $\frac{d^2y}{dx^2}$ when $y = e^x \sin x$

Watch Video Solution

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

Watch Video Solution

372. Find $\frac{d^2y}{dx^2}$ when $y = x^3 + \tan x$

Watch Video Solution

373. Find the second derivative of log x + cosx.

Watch Video Solution

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

Watch Video Solution

375. If $y = \log\left(x + \sqrt{x^2+1}\right)$, $provet\hat{}\left(x^2+1\right)d^2\dfrac{y}{dx^2} + x\dfrac{dy}{dx} = 0.$

Watch Video Solution

376. Find the second order derivative of $e^{x\tan x}$

Watch Video Solution

377. If $y = \tan^{-1} x$, find $\dfrac{d^2y}{dx^2}$ in terms of y alone.

Watch Video Solution

378. If $y = A\sin x + B\cos x$then prove that $d^2\dfrac{y}{dx^2} + y = 0$

Watch Video Solution

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

Watch Video Solution

380. 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

381. If $y = e^{ax}\cos bx$, then prove that $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + \left(a^2 + b^2\right)y = 0.$

Watch Video Solution

382. If $y = \left(\sqrt{x+1} - \sqrt{x-1}\right)$, then prove that $\left(x^2 - 1\right)y_2 + xy_1 = \frac{1}{4}y$

Watch Video Solution

383. $y = e^{m\sin^{-1}x}$, prove that $\left(1 - x^2\right)y_2 - xy_1 = m^2y$

Watch Video Solution

384. If $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, prove that $\left(\frac{d^2y}{dx^2}\right) = \frac{-b^4}{a^2y^3}$

Watch Video Solution

385. If $(x-a)^2 + (y-b)^2 = c^2$, for some $c > 0$, prove that $\frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}}}{\frac{d^2y}{dx^2}}$ is a constant independent of a and b.

Watch Video Solution

386. Find $\frac{d^2y}{dx^2}$, if $x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$

Watch Video Solution

387. 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

388. If $x = a\left\{\cos t + \log\left|\frac{\tan t}{2}\right|\right\}$ and y = a sin t, $0 < t < \frac{\pi}{2}$, find $\frac{d^2y}{dx^2}$

Watch Video Solution

389. 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

390. If $y = x\log\left(\frac{x}{a+bx}\right)$, prove that $x^3y_2 = (xy_1 - y)^2$

Watch Video Solution

391. If $x = g(t)$ and $y = f(t)$, find $\frac{d^2y}{dx^2}$ as a function of t.

Watch Video Solution

Watch Video Solution

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

Watch Video Solution

393. Find the second derivative of the following functions:

$ax^3 + bx^2 + cx + d$

Watch Video Solution

394. Find the second derivative of the following functions:

a^x

Watch Video Solution

395. Find the second derivative of the following functions:

x sin x

Watch Video Solution

396. Find the second derivative of the following functions:

log (logx)

Watch Video Solution

397. Find the second derivative of the following functions:

$e^{\sin x}$

Watch Video Solution

398. Find the second derivative of the following functions:

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

Watch Video Solution

399. Find the second derivative of the following functions:

sin 3 x sin 6 x

Watch Video Solution

400. Find the second derivative of the following functions:

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

Watch Video Solution

401. If $y = \sin^{-1} x$, then prove that

$$\frac{d^2y}{dx^2} = \frac{x}{(1 - x^2)^{\frac{3}{2}}}.$$

Watch Video Solution

402. 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

403. If $y = \sin^{-1} x$, prove that $\left(1 - x^2\right) y_2 - x y_1 = 0$

Watch Video Solution

404. Find the second order derivative of the following functions

If $y = x + \tan x$, prove that $\cos^2 x . \dfrac{d^2 y}{dx^2} - 2y + 2x = 0$

Watch Video Solution

405. Find the second order derivative of the following functions

If $y = ae^{mx} + be^{-mx}$, prove that $\dfrac{d^2 y}{dx^2} - m^2 y = 0$

Watch Video Solution

406. If $y = 3e^{2x} + 2e^{3x}$, prove that $d^2 \dfrac{y}{dx^2} - 5\dfrac{dy}{dx} + 6y = 0.$

Watch Video Solution

Watch Video Solution

407. Find the second order derivative of the following functions

If $y = a\cos(\log x) + b\sin(\log x)$, prove that $x^2y_2 + xy_1 + y = 0$.

Watch Video Solution

408. 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

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

Watch Video Solution

410. If $y = a\cos mx + b\sin mx$, prove that $y_2 + m^2y = 0$

Watch Video Solution

Watch Video Solution

411. Find the second order derivative of the following functions

If $y = \log\left[x + \sqrt{x^2 + a^2}\right]$, show that $\left(x^2 + a^2\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$

Watch Video Solution

412. If $y = \left[\log\left(x + \sqrt{x^2 + 1}\right)\right]^2$ then show that $\left(x^2 + 1\right)y_2 + xy_1 = 0$

Watch Video Solution

413. Find the second order derivative of the following functions

If $y = \frac{\sin^{-1} x}{\sqrt{1 - x^2}}$, prove that $\left(1 - x^2\right)y_2 - 3xy_1 - y = 0$

Watch Video Solution

414. If $x = \tan\left(\frac{1}{a}\log y\right)$, then show that $\left(1+X^2\right)\frac{d^2y}{dx^2} + (2x-a)\frac{dy}{dx} = 0$

Watch Video Solution

415. If $y = x^x$, prove that $y_2 - y^{-1}(y_1)^2 - yx^{-1} = 0$

Watch Video Solution

416. If $y = \left(\tan^{-1}x\right)^2$, then prove that $\left(1+x^2\right)^2\frac{d^2y}{dx^2} + 2x\left(1+x^2\right)\frac{dy}{dx} - 2 = 0$

Watch Video Solution

417. If $y = \left[\sin^{-1}x\right]^2$, then prove that : $\left(1-x^2\right)y_2 - xy_1 - 2 = 0.$

Watch Video Solution

418. Find the second order derivative of the following functions

If $y = \cos^{-1} x$, find $\frac{d^2y}{dx^2}$ in terms of y alone.

Watch Video Solution

419. If $y = \cos ec^{-1} x, x > 1,$ 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

420. If $y = x^x$, prove that $y_2 - y^{-1}(y_1)^2 - yx^{-1} = 0$

Watch Video Solution

421. If $y = e^{-ax}\cos(bx + c)$, show that $\frac{d^2y}{dx^2} + 2a\frac{dy}{dx} + \left(a^2 + b^2\right)y = 0$

Watch Video Solution

422. If $y^2 = ax^2 + b$, prove that $\frac{d^2y}{dx^2} = a\frac{b}{y^3}$

Watch Video Solution

423. If $x^2 + y^2 = a^2$, prove that $\frac{d^2y}{dx^2} = -\frac{a^2}{y^3}$

Watch Video Solution

424. If $x^m y^n = (x + y)^{m+n}$, prove that $\frac{dy}{dx} = \frac{y}{x}$ and $\frac{d^2y}{dx^2} = 0$

Watch Video Solution

425. If $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, prove that `(d^2y)/(dx^2) = -(b^4)/(a^2y^3)~

Watch Video Solution

426. If $\sqrt{x}+\sqrt{y}=\sqrt{x}$, find $\frac{d^2y}{dx^2}atx=a$

Watch Video Solution

427. Find $\frac{d^2y}{dx^2}$ if $x=at^2)$, y = 2 a t.

Watch Video Solution

428. Find $\frac{d^2y}{dx^2}$ if $x=\cos\theta, y=a\sin\theta)$

Watch Video Solution

429. If $x=a\sin^3\theta, y=a\cos^3\theta$, find $\frac{d^2y}{dx^2}at\theta=\frac{\pi}{4}$

Watch Video Solution

430. If x=a (cos t + t sin t) and y = a (sin t - t cos t), $f \in d$(d^2x)/(dt^2), (d^2y)/(dt^2) and (d^2y)/(dx^2)`. Also mention the domain of validity.

Watch Video Solution

431. Find $\frac{d^2y}{dx^2}$ in the following

If $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$, find $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$

Watch Video Solution

432. If $x = \frac{1-t^2}{1+t^2}, y = \frac{2t}{1+t^2}$, find $\frac{dy}{dx}$ at x=2.

Watch Video Solution

433. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = x^2 - 4x + 3 \in [1, 3]$

Watch Video Solution

434. Find the derivative of Following

$\tan(\log 3x)$

Watch Video Solution

435. Find the derivative of $\sin 2x + \cos ec5x$

Watch Video Solution

436. Find the derivative of $\cot 2x - \cos 9x$

Watch Video Solution

437. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \log\left(x^2 + 2\right) - \log 3 \text{in}[-1, 1]$

Watch Video Solution

438. 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

439. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \sin x + \cos x \text{in}\left[0, \frac{\pi}{3}\right]$

Watch Video Solution

440. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \sin x + \cos x - 1 \text{in} \left[0, \frac{\pi}{2}\right]$

Watch Video Solution

441. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \sin 3x \text{in} [0, \pi]$

Watch Video Solution

442. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \sin x - 1 \text{in} [0, 2\pi]$

Watch Video Solution

443. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = y = x(8 - x) \text{in} [0, 8]$

Watch Video Solution

444. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \sin 2x \text{in} \left[0, \frac{\pi}{2}\right]$

Watch Video Solution

445. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \left(x^2 + 2\right) \text{in} [-2, 2]$

Watch Video Solution

446. Verify Rolle's theorem for the following functions in the given intervals and find a point in the interval where the derivative vanishes :

$f(x) = \sin x \in [0, \pi]$

Watch Video Solution

447. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative vanishes : $f(x) = (x-1)(x-2)(x-3) \text{in} [1, 3]$

Watch Video Solution

448. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative vanishes : $f(x) = \left(x^2 - 1\right)(x-2) \text{in} [-1, 2]$

Watch Video Solution

449. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative

vanishes : $f(x) = x(x-1)^2 \text{in}[0,1]$

Watch Video Solution

450. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative vanishes : $f(x) = \sqrt{4-x^2}$ in $[-2,2]$

Watch Video Solution

451. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative vanishes : $f(x) = \log\left(\frac{x^2+ab}{(a+b)x}\right)$ in [a,b], a>0

Watch Video Solution

452. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative

vanishes : $f(x) = x(x+3)e^{-\frac{x}{2}}$ in $[-3, 0]$

Watch Video Solution

453. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative vanishes : $f(x) = (x-2)^2(x-3)^3$ in [2,3]

Watch Video Solution

454. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative vanishes : $f(x) = e^x(\sin x - \cos x)$ in $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$

Watch Video Solution

455. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) in the interval where the derivative

vanishes : $f(x) = \log\left(x^2 + 2\right) - \log(x + 2)$in[0,1]`

Watch Video Solution

456. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) where the derivative vanishes : $f(x) = e^x \cos x$in$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Watch Video Solution

457. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) where the derivative vanishes : $f(x) = \frac{\sin x}{e^x}in[0, \pi]$

Watch Video Solution

458. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) where the derivative vanishes :

$f(x) = e^{(1-x^2)}$ `in[-1,1]

Watch Video Solution

459. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) where the derivative vanishes : $f(x) = e^{-\frac{x}{2}}\left(x^2 + 3x\right)$ on [-3,0]

Watch Video Solution

460. Verify Rolle's theorem for the following functions in the given intervals and find a point (or point) where the derivative vanishes : $f(x) = \sin^4 x + \cos^4 x \text{in} \left[0, \frac{\pi}{2}\right]$

Watch Video Solution

461. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

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

Watch Video Solution

462. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

f(x) = |x| in [-1,1]

Watch Video Solution

463. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

$f(x) = 3 + (x-2)^{2/3}$in [1,3]

Watch Video Solution

464. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

f(x) = [x] in [-1,1]

Watch Video Solution

465. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

f(x) = (x-1)(2x-3) in [1,3]

Watch Video Solution

466. Discuss the applicability of Rolle's theorem for the following functions

$f(x) = |x - 1|, x \in [0, 2]$

Watch Video Solution

467. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

$f(x) = \tan x \text{in} [0, \pi]$

Watch Video Solution

468. Discuss the applicablity of Rolle's theorem for the following functions in the indicated intervals:

f(x) = x in [1,2]

Watch Video Solution

469. Apply Rolle's theorem to find point (or points) on the following curves where the tangent is parallel to x -axis. $y = x^2 \text{in} [-2.2]$

Watch Video Solution

470. Apply Rolle's theorem to find point (or points) on the following curves where the tangent is parallel to x -axis. $y = -1 + \cos x \text{in} [0, 2\pi]$

Watch Video Solution

471. Apply Rolle's theorem to find oint (or points) on the following curves where the tangent is parallel to x -axis. $y = 16 - x^2, x \text{in}[-1, 1]$

Watch Video Solution

472. Apply Rolle's theorem to find point (or points) on the following curves where the tangent is parallel to x -axis. $y = (x - 4)x$ in $[0, 4]$

Watch Video Solution

473. 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

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

$$f(x)\begin{cases}(x^2+1) & whe 0 \le x \le 1 \\ 3-x & when 1 < x \le 2\end{cases}$$

Watch Video Solution

475. If f and g are differentiable functions for $0 \le x \le 1$ such that $f(0)=2, g(0), f(1)=6, g(1)=2,$ then show that there exists c satisying 0 < c < 1 and f' (c) = 2g' (c)

Watch Video Solution

476. Verify Lagrange's mean value theorem for the function f(x) in the interval [3,5] where f(x) =(x-3)(x-6)(x-9)

Watch Video Solution

477. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = 2x - x^2$ on [0,1]

Watch Video Solution

478. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

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

Watch Video Solution

479. 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

480. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = (x)(x-1)(x-2) \text{in} \left[0, \frac{1}{2}\right]$

Watch Video Solution

481. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = \log x$ in [1,2]

Watch Video Solution

482. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = \sin x - \sin 2x \text{in } [0, \pi]$

Watch Video Solution

483. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = (x-1)(x-2)(x-3)$in[0,4]

Watch Video Solution

484. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

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

Watch Video Solution

485. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = \sqrt{25 - x^2}$in[1,5]

Watch Video Solution

486. Differentiate the function $f(x) = \sqrt{x-2}$

Watch Video Solution

487. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

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

Watch Video Solution

488. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = \tan^{-1}$ in [0,1]

Watch Video Solution

489. Verify Lagrange's mean value theorem for the following functions in the given interval and also find 'c' of this theorem:

$f(x) = \frac{1}{4x-1}$ in [1,4]

Watch Video Solution

490. Show that Lagrange's theorem is not applicable to the function $f(x) = \frac{1}{x}$ in [-1,1]

Watch Video Solution

491. Discuss applicability of Lagrange's mean value theorem to the function $f(x) = (x-1)^{2/3}$ in [1,2]

Watch Video Solution

492. Verify the Lagrange's Mean Value Theorem for the functions:

$f(x) = |x|$ in the interval [-1,1]

Watch Video Solution

493. Find a point on the curve $y = x^2$ where the tangent is parallel to the chord joining (0,0) and (1,1)

Watch Video Solution

494. Find a point on the curve $y = x^3$ where the tangent is parallel to the chord joining (1,1) and (3,27)

Watch Video Solution

495. 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

496. Using Mean value Theorem, prove that there is a point on the curve $y = 2x^2 - 5x + 3$ between the point A(1,0) and B(2,1). Where the tangent is parallel to the chord AB. Also find that point.

Watch Video Solution

497. Using differentials find an approximate value of $\sqrt{66}$

Watch Video Solution

498. Let $f(x) = \frac{\log(1+x)}{\sin x}$ for $x \neq 0$. Find f(0) if f is continuous at x = 0

Watch Video Solution

499. Let $f(x) = \frac{x + |x|}{x}$ for $x \neq 0$ and let f (0) = 0, Is f continuous at 0?

Watch Video Solution

500. Let f(X) = sin x cos x. Write down the set of points of discontinuity of f.

Watch Video Solution

501. Write the set of points of discontinuity of the signum function.

Watch Video Solution

502. Find the derivative of following

$\cot 7x + 3x^5 + \sin 3x$

Watch Video Solution

503. Let $f(x) = \frac{e^{1/x}}{1+e^{1/x}}$ for $x \neq 0$. Find f (0) if f is left continuous at x = 0

Watch Video Solution

504. Show that the function $f(x) = \begin{cases} x^n \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ is continuous but not differentiable at x= 0.

Watch Video Solution

505. Find a $\in$ R so that $f(x) = \begin{cases} x^2 & x \geq 0 \\ ax & x < 0 \end{cases}$ is continuous at 0.

Watch Video Solution

506. Let $f(x) = \frac{2^{\frac{1}{x}}}{1+2^{\frac{1}{x}}}$ for $x \neq 0$. Find f(0) if f is right continuous at x = 0

Watch Video Solution

Watch Video Solution

507. Let $f(x) = [\sin x]$, is f continuous at $x = \frac{\pi}{2}$

Watch Video Solution

508. Let $f(x) = \begin{cases} 2x - 5 & \text{if } x \geq 2 \\ x^2 & \text{if } x < 2 \end{cases}$. Is f continuous at x = 2?

Watch Video Solution

509. Determine the value of the constant k so that the function $f(x) = \begin{cases} 3x - 8 & \text{if } x \leq 5 \\ 2k & \text{if } x > 5 \end{cases}$ is continuous at x = 5

Watch Video Solution

510. Given $f(x) = \frac{1}{x + 2}$. Write down the set of points of discontinuity of f(f(x))

Watch Video Solution

511. Write down the domain of continuity of the function f(x) = x|x|

Watch Video Solution

512. Let f(x) = $|x|\cos\left(\frac{1}{x}\right)$ for $x \neq 0$. Write the down the value of (f) (0) if f is continuous at x = 0

Watch Video Solution

513. Write down the domain of continuity of $f(x) = e^{|x|}$

Watch Video Solution

514. Let $f(x) = x[x]$. Is f continuous on left of x = 2.

Watch Video Solution

515. 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

516. Find $\frac{d}{dx}\left(\frac{1}{\sqrt{1 - x^2}} \right.$

Watch Video Solution

517. Compute $\frac{d}{dx}(x|x|) when x < 0$

Watch Video Solution

518. Find $\frac{dy}{dx}$ when $xy = 1$

Watch Video Solution

519. Write down the value of $\frac{dy}{dx}$ at $x = e$ when $y = \log_a x$

Watch Video Solution

520. Compute $\frac{d}{dx}\left(\sin^{-1}(\sin x)\right)$ when $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$

Watch Video Solution

521. Find $\frac{d}{dx}\left(\cos^{-1}(\cos x)\right)$ when $\pi \leq x \leq 2\pi$

Watch Video Solution

522. Find $\frac{d}{dx}\left(\tan^{-1}(\tan x)\right) when -\frac{\pi}{2} < x < \frac{\pi}{2}$

Watch Video Solution

523. Compute $\lim_{h \to 0} \left(\frac{\sin(x+h) - \sin x}{h} \right)$

Watch Video Solution

524. Compute $\frac{d}{dx}(\log_e |\sin x|), \ -\frac{\pi}{2} < x < \frac{\pi}{2}$

Watch Video Solution

525. Find the value of $\sin^{-1}\left(\cos\left(\sin^{-1} x\right)\right) + \cos^{-1}\left(\sin\left(\cos^{-1} x\right)\right)$

Watch Video Solution

526. If f(x) is an even function, state whether f'(x) is an odd function or an even function.

Watch Video Solution

527. Find $\frac{dy}{dx} when y = x^x, x > 0$

Watch Video Solution

528. Compute $\frac{d}{dx}\left(\frac{\log x}{x}\right)$

Watch Video Solution

529. If x = sin t, y = cos t, find $\frac{dy}{dx}$

Watch Video Solution

530. Find the differential coefficient of $\sqrt{1+x^2}$ w.r.t $1+x^2$

Watch Video Solution

531. If $f(x) = \log_x(\log x)$ then the value of f'(e) is

Watch Video Solution

532. If $f(x) = 1 - x$, find (d/dx)(fof)(x)

Watch Video Solution

533. If $y = f(\log_e x)$ and $f'(2) = 2$, find dy/dx at $x = e^2$

Watch Video Solution

534. If $y = a \sin x + b \cos x$, find $\frac{d^2y}{dx^2}$ in terms of y.

Watch Video Solution

535. If y =x^2, write the value of (d^3y)/(d(x)^3) at x = 0

Watch Video Solution

536. What is the value of the $\underset{h \to 0}{Lt}\left(\frac{\log(e+h) - \log e}{h}\right)$?

Watch Video Solution

537. If $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and -1 < x < 1, $f \in$ ddy/dx

Watch Video Solution

538. Find $\frac{d}{dx}(\sin(\cos x) + \cos(\sin x))$

Watch Video Solution

539. Find $\frac{d}{dx}\left(e^{\sqrt{1+x^2}}\right)$

Watch Video Solution

540. Find $\frac{d}{dx}\left(2^{\cos^2 x}\right)$

Watch Video Solution

541. Compute $\frac{d}{dx}\left(\sin^n\left(ax^2+bx+c\right)\right), n \in N.$

Watch Video Solution

542. If $f(x) = \sin^{-1} x + \cos^{-1} x,$ find f' (x)

Watch Video Solution

543. Find $\frac{d}{dx}\left(\frac{8^x}{x^8}\right)$

Watch Video Solution

544. Compute $\frac{d}{dx}\left\{\sin^{-1}\left(\frac{1}{\sqrt{x+1}}\right)\right\}$

Watch Video Solution

545. Evaluate $\frac{d}{dx}(\sin^m x \cos^n x)$, where m,n inN`.

Watch Video Solution

546. If $y = (\sin x)^{\cos x}$, find $\frac{dy}{dx}$

Watch Video Solution

547. Differentiate $\frac{x}{\sin x} w.r.t \sin x$

Watch Video Solution

548. If $y = \tan^{-1} x$, find $\frac{d^2y}{dx^2}$ in terms of y alone.

Watch Video Solution

549. Find $\frac{dy}{dx}$ when $\tan^{-1}(x^2 + y^2) = a^2$

Watch Video Solution

550. If $y = t + \frac{1}{t}$ and $x = t - \frac{1}{t}$ find $\frac{dy}{dx}$

Watch Video Solution

551. Find $\frac{dy}{dx} when y = \tan(x + y)$

Watch Video Solution

552. Find $\frac{d}{dx}\left(\tan\sqrt{x}\right)$

Watch Video Solution

553. Find $\frac{d}{dx}\left(\tan\sqrt{x}\right)$

Watch Video Solution

554. If $f(x) = |\sin x - \cos x|$, find f' $(\pi / 6)$

Watch Video Solution

555. If $f(x) = |\sin x| + |\cos x|$, find $f'\left(\frac{3\pi}{4}\right)$

Watch Video Solution

556. If $y = \sec x + \tan x$, then prove that $\frac{dy}{dx} = \frac{1}{1 - \sin x}$

Watch Video Solution

557. Can Rolle's Theorem be applied to the function $f(x) = |x|$ in the interval [-2,2]

Watch Video Solution

558. Does there exist a point $c(\in)\left(0, \frac{\pi}{2}\right)$ such that f' (c)= 0 where f(x) = sin 2x`?

Watch Video Solution

559. Can Lagrange's Theorem be applied to the function $f(x) = \sqrt{1-x^2}$ in the interval [0,1]

Watch Video Solution

560. Is Lagrange's Theorem applicable to the function f(x) = |x| on the interval [-1,2]

Watch Video Solution

561. Can we find a point $c^{\in}\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ such that f'© = 0 where f(x) = |sinx|

Watch Video Solution

562. Find a point $c^{\in}(-1, 2)$ such that $f'© = \frac{f(2) - f(-1)}{2 - (-1)}$ where $f(x) = x^2$

Watch Video Solution

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

Watch Video Solution

564. Prove that the function $f(x) = 5x - 3, iscontNuousatx = 0, atx = -3$ and $atx = 5$

Watch Video Solution

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

Watch Video Solution

566. Examine the following functions for continuity.

f(x) = x-5

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

571. 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

572. 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

573. 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

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

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

Watch Video Solution

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

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

Watch Video Solution

576. 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

577. 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

578. 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

579. Is the function defined by $f(x) = \begin{cases} x+5 & \text{if } x \leq 1 \\ x-5 & \text{if } x > 1 \end{cases}$ a continuous function?

Watch Video Solution

580. Disuss the continuity of the function f where f is defined by

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

583. 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

584. For what value of λ is the function defined by $f(x) = \{\lambda(x^2 - 2x), \quad \text{if} \quad x \leq 0, 4x + 1, \quad \text{if} \quad x > 0\}$ continuous at x = 0? What about continuity at x = 1?

Watch Video Solution

585. 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

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

591. Find all points of discontinuity of f, where: $f(x) = \begin{cases} \frac{\sin x}{x} & \text{if } x < 0 \\ x + 1 & \text{if } x \geq 0 \end{cases}$

Watch Video Solution

592. 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

593. Examine the continuity of f, where f is defined by $f(x) = \begin{cases} \sin x - \cos x & \text{if } x \neq 0 \\ -1 & \text{if } x = 0 \end{cases}$.

Watch Video Solution

594. 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

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

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

Watch Video Solution

596. Determine the value of the constant k so that the function $f(x) = \begin{cases} kx + 1 & \text{if } x \leq 5 \\ 3x - 5 & \text{if } x > 5 \end{cases}$ is continuous at x = 5.

Watch Video Solution

597. Find the values of a and b such that the function defined by $f(x) \begin{cases} 5 & \text{if } x \geq 2 \\ ax + b & \text{if } 2 < x < 10 \\ 21 & \text{if } x \geq 10 \end{cases}$ is continuous.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

602. Differentiate the following functions with respect to x. $\sin\left(x^3 + 5x\right)$

Watch Video Solution

603. Differentiate the following functions with respect to x. $\cos(\sin x)$

Watch Video Solution

604. Differentiate the following functions with respect to x.

$\sin(ax + b)$

Watch Video Solution

605. Differentiate the functions with respect to x: $\sec\left(\tan\left(\sqrt{x}\right)\right)$

Watch Video Solution

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

Watch Video Solution

607. Differentiate the functions with respect to x: $\cos x^3 \cdot \sin^2\left(x^5\right)$

Watch Video Solution

608. Differentiate the following functions with respect to x.

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

Watch Video Solution

609. Differentiate the functions with respect to x

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

2x+3y = sinx

Watch Video Solution

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

2x +3y = sin y`

Watch Video Solution

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

$ax + by^2 = \cos y$

Watch Video Solution

615. Find $\frac{dy}{dx}$ in the following: $xy + y^2 = \tan x + y$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

619. Find $\frac{dy}{dx}$, if $\sin^2 x + \cos^2 y = 1$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

622. 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

623. Find $\frac{dy}{dx}$ in the following:`y=sin^-1((1 - x^2)/(1+x^2), 0

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

626. 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

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

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

Watch Video Solution

628. Differentiate the following w.r.t x

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

Watch Video Solution

629. Differentiate the following w.r.t x

e^{x^3}

Watch Video Solution

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

Watch Video Solution

631. Differentiate the following w.r.t. x: $\log(\cos e^x)$

Watch Video Solution

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

Watch Video Solution

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

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

Watch Video Solution

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

$\log(\log x), x < 1$

Watch Video Solution

635. Differentiate the following w.r.tx:

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

Watch Video Solution

636. Differentiate the functions :

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

Watch Video Solution

637. Differentiate the function w.r.t. x : $\frac{\sqrt{(x-1)(x-2)}}{(x-3)(x-4)(x-5)}$

Watch Video Solution

638. Differentiate the functions :

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

Watch Video Solution

639. Differentiate the functions :

$x^x - 6^{\cos x}$

Watch Video Solution

640. Differentiate the function w.r.t. x : $(x+3)^2 \cdot (x+4)^3 \cdot (x+5)^4$

Watch Video Solution

641. Differentiate the function w.r.t. x : $\left(x+\frac{1}{x}\right)^{x}+x^{\left(1+\frac{1}{x}\right)}$

Watch Video Solution

642. Differentiate the function w.r.t. x : $(\log x)^{x}+x^{\log x}$

Watch Video Solution

643. Differentiate the function w.r.t. x : $(\sin x)^{x}+\sin^{-1}\sqrt{x}$

Watch Video Solution

644. Differentiate the function w.r.t. x : $x^{\sin x}+(\sin x)^{\cos x}$

Watch Video Solution

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

Watch Video Solution

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

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

651. 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

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

Watch Video Solution

653. 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

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

Watch Video Solution

655. 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

656. 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

657. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations (without eliminating the parameter).

$x = a\cos\theta, y = b\cos\theta$

Watch Video Solution

658. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations (without eliminating the parameter).

$x = \sin t, y = \cos 2t$

Watch Video Solution

659. 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

660. 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

661. 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

662. Find $\frac{dy}{dx}$ if $x = \frac{\sin^3 t}{\sqrt{\cos 2t}}, y = \frac{\cos^3 t}{\sqrt{\cos 2t}}$

Watch Video Solution

663. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations (without eliminating the parameter).

$x = a\left(\cos t + \log \tan\left(\frac{t}{2}\right)\right), y = a \sin t.$

Watch Video Solution

664. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations (without eliminating the parameter).

$x = a \sec \theta, y = b \tan \theta.$

Watch Video Solution

665. Find $\frac{dy}{dx}$, if x and y are connected parametrically by the equations (without eliminating the parameter).

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

Watch Video Solution

666. If $x = \sqrt{a}^{\sin^{-1}t}, y = \sqrt{a^{\cos^{-1}t}}$, show that $\frac{dy}{dx} = -\frac{y}{x}, a > 0$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

673. Find the second order derviatives of the functions :

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

677. If $y = 2\cos x - 6\sin x$, prove that $\frac{d^2y}{dx^2} + y = 0$

Watch Video Solution

678. Find the second order derivative of the following functions

If $y = \cos^{-1} x$, find $\frac{d^2y}{dx^2}$ in terms of y alone.

Watch Video Solution

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

Watch Video Solution

680. Find the second order derivative of the following functions

If $y = ae^{mx} + be^{-mx}$, prove that $\frac{d^2y}{dx^2} - m^2y = 0$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

683. 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

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

Watch Video Solution

685. 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

686. 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

687. 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

688. 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

689. 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

690. 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

691. 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

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

698. 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

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

702. 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

703. 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

704. 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

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

Watch Video Solution

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

Watch Video Solution

707. 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

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

Watch Video Solution

709. 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

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

Watch Video Solution

711. Fill in the blanks:

The function f(x)= $\lfloor x \rfloor$ is discontinuous at all points of the set of ..... .

Watch Video Solution

712. The number of points at which the function $f(x) = \frac{1}{\log|x|}$ is discontinuous is ___

Watch Video Solution

713. Fill in the blanks:

An example of a function which is continuous every where and differentiale at all poins except 0 is ..... .

Watch Video Solution

714. If $f(x) = \begin{cases} ax + 1 & \text{if } x \geq 1 \\ x + 2 & \text{if } x < 1 \end{cases}$ is continuous, then 'a' should be equal to ____

Watch Video Solution

715. Find a $\in$ R so that $f(x) = \begin{cases} x^2 & x \geq 0 \\ ax & x < 0 \end{cases}$ is continuous at 0.

Watch Video Solution

716. Fill in the blanks:

For all x $\in$ (6,7), $\frac{d}{dx}([x])$ = ...

Watch Video Solution

717. Fill in the blanks:

Derivative of sin x w.r.t cos x is ..... .

Watch Video Solution

718. Fill in the blanks:

Derivative of x^2 wr.t x^3 is ..... .

Watch Video Solution

719. Fill in the blanks:

If $x \geq 0$, then $\frac{d}{Dx}\left\{\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$ is equal to ..... .

Watch Video Solution

720. The derivative of sin x cos x w.r.t. x is

Watch Video Solution

721. Fill in the blanks:

The derivative of $\log_{10} x$ w.r.t x is `..... .

Watch Video Solution

722. Fill in the blanks:

If $f(x) = |\sin x|$, then $f'\left(\frac{\pi}{4}\right)$ is equal to ..... .

Watch Video Solution

723. Fill in the blanks:

Domain of continuity of the function f(x) =|x-1| is ..... .

Watch Video Solution

724. Fill in the blanks:

An example of a function which is continuous everywhere but fails to be differentiable exactly at two points 2 and 3 is ..... .

Watch Video Solution

725. Fill in the blanks:

For the curve $\sqrt{x}+\sqrt{y}=1, \frac{dy}{dx} at\left(\frac{1}{4}, \frac{1}{4}\right)$ is .....

Watch Video Solution

726. Fill in the blanks:

If f(x) = $x^{2/3}$, then f'(0) is ..... .

Watch Video Solution

727. Fill in the blanks:

Rolle's Theorem is not applicable to the function $f(x)=(x-1)^{2/3}$ on [0,2] as f is not derivable at ..... .

Watch Video Solution

728. Every continuous function is differentiable.

Watch Video Solution

729. True or False :

$\frac{d}{dx}(\log x) = \frac{1}{x}$ for all $x \neq 0$.

Watch Video Solution

730. True or False :

$\frac{d}{dx}(\log|x|) = \frac{1}{x}$ for all $x \neq 0$

Watch Video Solution

731. If f is continuous on its domain D, then |f| is also continuous on D.

Watch Video Solution

732. True or False :

Rolle's Theorem is applicable to the function $f(x) = |\sin x|$ in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Watch Video Solution

733. Verify the truth of Rolle's Theorem for the following functions:

f(X) = |x-1| in [1,2]

Watch Video Solution

734. True or False :

The function $f(x) = \log x^2$ has only one point of discontinuity.

Watch Video Solution

735. The composition of two continuous function is a continuous function.

Watch Video Solution

736. true false: $\cos|x|$ is differentiable every where.

Watch Video Solution

737. True or False :

The function $f(x) = \begin{cases} x + a & x \geq 1 \\ ax^2 + 1 & x < 1 \end{cases}$ is continuous at x = 1, whatever 'a' may be.

Watch Video Solution

738. True or False :

The function $f(x) = |\sin x|$ is differetiable at all $x \in R$.

Watch Video Solution

739. Find a $\in$ R so that $f(x) = \begin{cases} x^2 & x \geq 0 \\ ax & x < 0 \end{cases}$ is continuous at 0.

Watch Video Solution

740. For continuity, at x=a, each of $\lim_{x \to a^+} f(x)$ and $\lim_{x \to a^-} f(x)$ is equal to f(a).

Watch Video Solution

741. True or False :

$$\frac{d}{dx}(\log_{10} x) = \frac{1}{x} f \text{ or } all x > 0$$

Watch Video Solution

742. True or False :

If $\underset{x \to a}{L} tf(x)g(x)$ exists then both $\underset{x \to a^+}{L} tf(X)$ and $\underset{x \to a^-}{L} tg(x)$ exist separately.

Watch Video Solution

743. If $f \cdot g$ is continuous at x=a, then f and g are separately continuous at x=a.

Watch Video Solution

744. All trigonometric functions have inverse over their respective domains.

Watch Video Solution

745. True or False :

An increasing function is always a continuous function.

Watch Video Solution

746. True or False :

The function f(x) = |x-1| is a continuous function.

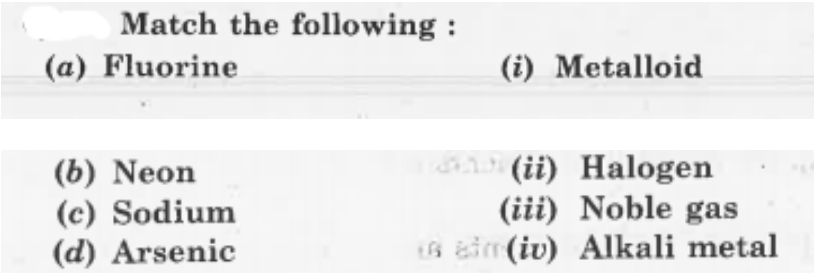
Watch Video Solution

747. True or False :

Derivative of an even function is always an odd function.

Watch Video Solution

748. Match the following:



Watch Video Solution

749. $\lim_{x} \rightarrow 0 \frac{e^{x}-1}{x}$ is equal to :

A. 0

B. 1

C. e

D. none of these

Watch Video Solution

750. If a>0,$a \neq 1$, then $\log_a(x^n) =$

A. $n \log_a x$

B. $n + \log_a x$

C. $\frac{1}{n} \log_a x$

D. none of these

Watch Video Solution

751. Which of the following is not true

A. $1 < \frac{e^x - 1}{x} < \frac{1}{1-x} f \text{ or } 0 < x < 1$

B. $\log(1+x) \leq xf \text{ or } x \geq 0$

C. $\log(1+x) < xf \text{ or } x > 0$

D. $\log(1+X) < xf \text{ or } x \geq 0)$

Watch Video Solution

752. $\lim_{x \to 0} \frac{e^x - 1}{x}$ is equal to

A. 2

B. 0

C. 1

D. none of these

Watch Video Solution

753. $\lim_{x} \to 0\left(\frac{\log(1+x)}{\sin x}\right.$ is equal to :

A. 0

B. 1

C. e

D. none of these

Watch Video Solution

754. $\underset{x \to e}{Lt}\left(\frac{\log x - 1}{x - e}\right)$ is equal to

A. 1

B. 0

C. e

D. $\frac{1}{e}$

Watch Video Solution

755. 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. none of these

Watch Video Solution

756. If $(x) = 2x$ and $g(x) = \frac{x^2}{2} + 1$, then which of the following can be a discontinuous function

A. f(x) + g(x)

B. f(x) - g(x)

C. f(x)g(x)

D. $\frac{g(x)}{f(x)}$

Watch Video Solution

757. Let $f(x) = \begin{cases} x + a & x \leq 1 \\ ax^2 + 1 & x > 1 \end{cases}$. Show that f is continuous at 1. Find 'a' so that it is derivable at 1.

A. a = 0

B. a = 1

C. all $a \in R$

D. none of these

Watch Video Solution

758. Let $f(x) = \begin{cases} \frac{3x+4\tan x}{x} & x \neq 0 \\ k & x = 0 \end{cases}$ then f is continuous at x = 0 for

A. k = 7

B. k = 1

C. no k

D. none of these

Watch Video Solution

759. Let $f(x) = x\left(\frac{2^x - 1}{1 - \cos x}\right)$ for $x \neq 0$. What choice of f(0), if any, will make f continous at 0?

A. log 2

B. $\frac{1}{2}\log 2$

C. $\frac{1}{2}\log 2$

D. 2 log 2

Watch Video Solution

760. If $f(x) = x^2 \sin\frac{1}{x}$, where $x \neq 0$ then the value of the function f at x=0, so that the function is continuous at x=0, is

A. 0

B. -1

C. 1

D. none of these

Watch Video Solution

761. 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

Watch Video Solution

762. The function given by f(x)=tax x is discontinuous on the set

A. $(n\pi : n \in Z)$

B. $(2n\pi : \neq Z)$

C. $\left\{(2n+1)\frac{\pi}{2}, n \in Z\right)$

D. $\left\{\frac{n\pi}{2}, n \in Z\right\}$

Watch Video Solution

763. The function $f(x) = \cot x$ is discontinuous on the set

A. $(x = n\pi : n \in Z)$

B. $(x = 2n\pi, n \in Z)$

C. {x = (2n+1) pi/2, n in Z}`

D. $\left\{x = \frac{n\pi}{2}, n \in Z\right\}$

Watch Video Solution

764. The function f(x) = [x], where [x] denotes the greatest integer function, is continuous at

A. 4

B. -2

C. 1

D. 1.5

Watch Video Solution

765. The number of points at which the function $f(x) = \frac{1}{x - [x]}$ is not continuous is

A. 1

B. 2

C. 3

D. none of these

Watch Video Solution

766. The function $f(x) = \frac{4 - x^2}{4x - x^3}$ is

A. discontinuous at only one point

B. disconitnuous exactly at two points

C. discontinuous exactly at three poins

D. none of these

Watch Video Solution

767. Let f (x) = x |x|, then f (0) is equal to

A. 1

B. -1

C. 0

D. none of these

Watch Video Solution

768. If f(x) = log |x|, then for $x \neq 0$ f'(x) is equal to

A. $\frac{1}{|x|}$

B. $\frac{1}{x}$

C. $-\frac{1}{x}$

D. $\frac{1}{x}$ or $-\frac{1}{x}$

Watch Video Solution

769. Let $f(x) = |\sin x|$. Then

A. f is everywhere differentiable

B. f is everywhere continuous but not differentiable at x = $n\pi$, $n \in Z$

C. f is every where cotinuous but not differentiable at

$$x = (2n+1)\frac{\pi}{2}, n \in Z$$

D.

Watch Video Solution

770. The set of points where the function f given by $f(x) = |2x-1|\sin x$ is differentiable is

A. R

B. $R - \left\{\frac{1}{2}\right\}$

C. $(0, \infty)$

D. none of these

Watch Video Solution

771. Lt f(x) = |cos x|, then

A. f is differentiale at all $x \in R$

B. f is continuous at all ξnR but not differentiable at $x = n\pi, n \in Z$

C. f is continuous every where but not differentiable at $x = (2n+1)\frac{\pi}{2}, n \in Z$

D. none of these

Watch Video Solution

772. 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

Watch Video Solution

773. The derivative of $\cos^{-1}(2x^2 - 1)$ w.r.t. $\cos^{-1} x$ is

A. 2

B. $\frac{2x}{|x|}$

C. $1 - x^2$

D. $\frac{-1}{\sqrt{2}(1 - x^2)}$

Watch Video Solution

774. If $y = \log\left(\frac{1 - x^2}{1 + x^2}\right)$, then $\frac{dy}{dx}$ is equal to

A. $\frac{4x^3}{1 - x^4}$

B. $\frac{-4x}{1 - x^4}$

C. $\frac{1}{4x - x^4}$

D. $\frac{-4x^3}{1 - x^4}$

Watch Video Solution

775. $\frac{d}{dx}\left\{\log\left(x + \sqrt{x^2 + 1}\right)\right\}is$

A. $\sqrt{X^2 + 1}$

B. $\frac{x}{\sqrt{x^2 + 1}}$

C. $x\sqrt{x^2 + 1}$

D. $\frac{1}{\sqrt{x^2 + 1}}$

Watch Video Solution

776. If $y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$, then $\frac{dy}{dx}$=

A. $1 + y^2$

B. $y^2 - 1$

C. $1 - y^2$

D. none of these

Watch Video Solution

777. If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ is equal to

A. $\frac{\cos x}{2y - 1}$

B. $\frac{\cos x}{1 - 2y}$

C. $\frac{\sin x}{1 - 2y}$

D. $\frac{\sin x}{2y - 1}$

Watch Video Solution

778. 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. $\frac{3t}{2}$

Watch Video Solution

779. If $y = ae^{mx} + be^{-(mx)}$, then $\frac{d^2y}{dx^2}$ =

A. m^2y

B. $-m^2y$

C. my

D. $-my$

Watch Video Solution

780. Lagranges's mean value theorem is not applicable to f(x) in [1,4] where f(X) =

A. $x^2 - 2x$

B. |x-2|

C. x|x|

D. x^3

Watch Video Solution

781. The value of c in Rolle's Theorem for the function $f(x) = e^x \sin x, x \in [0, \pi]$ is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. $\frac{3\pi}{4}$

Watch Video Solution

782. The value of 'c' in Rolle's Theorem for the function $f(x) = x^3 - 3x$ in the interval $[0, \sqrt{3}]$ is

A. 1

B. -1

C. $\frac{3}{2}$

D. $\frac{1}{3}$

Watch Video Solution

783. If $y = \tan^{-1}\left(2\frac{x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $f \in d$dy/dx$when$x in (0,1)`

A. $\frac{4}{1+X^2}$

B. 0

C. $\frac{2}{1+x^2}$

D. none of these

Watch Video Solution

784. If $f(x) = x^2 + \frac{x^2}{1+x^2} + \frac{x^2}{(1+x^2)^2} + \ldots.$ up to ∞, then at x = 0 , f(x)

A. has not limit

B. is continuous but not differentiable

C. is discontinuous

D. is differentiable

Watch Video Solution

785. For the function $f(x) = x + \frac{1}{x}, x \in [1, 3]$, the value of c for mean value theorem is

A. 1

B. $\sqrt{3}$

C. 2

D. none of these

Watch Video Solution

786. 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. none of these

Watch Video Solution

787. Let $f(x) = \sqrt{1 - \sqrt{1 - x^2}}$ then f(x) is

A. continuous on [-1,1] and differentiable on (-1,1)

B. continuous on [-1,1] and differentiable on $(-1, 0), \cup (0, 1)$

C. continuous and differentiableon (-1,1)

D. none of these

Watch Video Solution

788. Domain of differentiability of the function $f(x) = |x - 2|\cos x$ is

A. R

B. R - {2}

C. $(0, \infty)$

D. none of these

Watch Video Solution