MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

DERIVATIVES

Solved Examples And Exercises

1. Differentiate the following with respect to x : (i) $x^3 e^x \sin x$ (ii) $x \sin x \log x$ (iii) $x^n (\log)_a x e^x$

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2. Differentiate the following functions with respect to x : $\frac{x + e^x}{1 + \log x}$

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3. If $f(x) = \alpha x^n$, prove that $\alpha = \frac{f'(1)}{n}$.

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4. Differentiate the following functions with respect to x : $(ax + b)^n (cx + d)^n$

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5. If $f(x) and g(x)$ are two differentiable functions, show that $f(x)g(x)$ is also differentiable such that $\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}\{g(x)\} + g(x)\frac{d}{dx}\{f(x)\}$

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6. The differentiation of $(\log)_a x$ (a >0) with respect to x i.e. $\frac{d}{dx}\left((\log)_a x\right) = \frac{1}{x(\log)_e a}$

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7. If $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$, prove that $2xy\frac{dy}{dx} = \left(\frac{x}{a} - \frac{a}{x}\right)$

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8. If for $f(x) = \lambda x^2 + \mu x + 12$ and $f'(4) = 15$ and $f'(2) = 11$, then find λ and μ

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9. Differentiate $x^2 \cos x$

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10. Using first principles, prove that $\frac{d}{dx}\left\{\frac{1}{f(x)}\right\} = -\frac{f'(x)}{\{f(x)\}^2}$

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11. If $y = \sqrt{\frac{1-\cos 2x}{1+\cos 2x}}, x \in \left(0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right)$, then find $\frac{dy}{dx}$.

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12. The differentiation of $\log_e x, is \frac{1}{x}$. i.e. $\frac{d}{dx}\left((\log_e x) = \frac{1}{x}\right)$

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13. Differentiate the following functions with respect to x from first principles: $\sqrt{ax+b}$

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14. Differentiate x^n by first princeple

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15. Differentiate the following functions with respect to x from first principles: $\tan\sqrt{x}$

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16. The differentiation of $tanx$ with respect to x is $\sec^2 x$. i.e. $\frac{d}{dx}(\tan x) = \sec^2 x$

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17. The differentiation of $\cot x$ with respect to x is $-\cos ec^2 x \cdot$ i.e. $\frac{d}{dx}(\cot x) = -\cos ec^2 x$

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18. (x) The differentiation of secx with respect to x is $\sec x \tan x$

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19. The differentiation of $\cos ecx$ with respect to x is $-cosecx \cot x \cdot$ i.e.

$\frac{d}{dx}(\cos ec) = -\cos ecx \cot x$

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20. The differentiation of e^{-x} with respect to x is $-e^{-x}$. i.e. $\frac{d}{dx}\left(e^{-x}\right) = -e^{-x}$

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21. Differentiate the following functions with respect to x: $e^{3\log x}$

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22. Let $f(x)$ be a differentiable and let c a be a constant. Then $cf(x)$ is also differentiable such that $\frac{d}{dx}\{cf(x)\} = c\frac{d}{dx}(f(x))$.

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

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

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

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

D. None of these

Answer: A

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24. Differentiate the following functions with respect to x : $\frac{3^x}{x + \tan x}$

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25. Differentiate the following functions with respect to x : $\frac{10^x}{\sin x}$

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26. $f(x) = x^2 e^x \log x$

differentiate f(x) with respect to x at x = 1

A. 0

B. 1

C. e

D. none of these

Answer: C

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27. Differentiate the following functions with respect to x $\dfrac{\sec x + \tan x}{\sec x - \tan x}$

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28. If $y = 1 + \dfrac{x}{1!} + \dfrac{x^2}{2!} + \dfrac{x^3}{3!} + + \dfrac{x^n}{n!}$, show that $\dfrac{dy}{dx} - y + \dfrac{x^n}{n!} = 0.$

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29. If $y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + ,$ show that $\frac{dy}{dx} = y - \frac{x^n}{n!}$

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30. Differentiate the following functions with respect to x

$x^4(5\sin x - 3\cos x)$

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31. Differentiate the following functions with respect to x

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

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32. Differentiate the following functions with respect to x : $\dfrac{e^x + \sin x}{1 + \log x}$

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33. Differentiate the following functions with respect to x : $\frac{e^x - \tan x}{\cot x - x^n}$

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34. The differentiation of $\cos x$ with respect to x is -sinx i.e. $\frac{d}{dx}(\cos x) = -\sin x$

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35. The differentiation of $\sin x$ with respect to x is $\cos x \cdot$ i.e. $\frac{d}{dx}(\sin x) = \cos x$

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36. Differentiate $\log \sin x$ from the first principles.

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37. Find the derivative of $s \in x3$ from first principles.

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38. The differentiation of $a^x (a > 0, a \neq 1)$ with respect to x is $a^x (\log)_e a$. i.e. $\frac{d}{dx}(a^x) = a^x (\log)_e a$

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39. Differentiate $e^{\sqrt{\tan x}}$ from the first principle.

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40. If $f(x) = x^n$ where $x \in R$, then differentiation of x^n with respect to x $is x^{n-1}$.

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41. Find the derivatives of $f(x) = \tan x at x = 0$

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42. If is a real valued function defined by $f(x) = x^2 + 4x + 3,$ then find $f'(1) and f'(3).$

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43. If $f(x) and g(x)$ are differentiate functions, then show that $f(x) \pm g(x)$ are also differentiable such that

$$\frac{d}{dx}\{f(x) \pm g(x)\} = \frac{d}{dx}\{f(x)\} \pm \frac{d}{dx}\{g(x)\}$$

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44. If $f(x) and g(f)$ are two differentiable functions and $g(x) \neq 0$, then show that $\frac{f(x)}{g(x)}$ is also differentiable

$$\frac{d}{dx}\left\{\frac{f(x)}{g(x)}\right\} = \frac{g(x)\frac{d}{dx}\{f(x)\} - f(x)\frac{d}{dx}\{g(x)\}}{[g(x)]^2}$$

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45. If u, v and w are functions of x, then show that $\frac{d}{dx}(uvw) = \frac{du}{dx}vw + u\frac{dv}{dx}w + uv\frac{dw}{dx}$ in two ways - first by repeated application of product rule, second by logarithmic differentiation.

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46. Differentiation of a constant function is zero i.e., $\frac{d}{dx}(c) = 0.$

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47. If $f(x) = mx + c$ and $f(0) = f'(0) = 1$.

What is $f(2)$?

A. 2

B. 1

C. 0

D. none of these

Answer: B

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48. Find

$$\frac{dy}{dx}, when y = 3\tan x + 5(\log)_a x + \sqrt{x} - 3e^x + \frac{1}{x}.$$

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49. Differentiate the following functions with respect to x from first principles: $\cot \sqrt{x}$

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50. Differentiate the following functions with respect to x from first principles: $\sqrt{\sin x}$

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51. Differentiate the following functions with respect to x from first principles: $\sin\left(\sqrt{x}\right)$

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52. Differentiate the following functions with respect to x from first principles: $\sqrt{ax+b}$

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53. Differentiate the following functions with respect to x from first principles: $\frac{1}{x}$

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54. Differentiate the following functions with respect to x from first principles: $\frac{x-1}{x+1}$

A. $\frac{x-1}{x+1}$

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

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

D. None of these

Answer: C

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55. Find the derivative of $f(x) = k\ at\ x = 0\ and\ x = 5.$

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56. Find the derivative of $sin x\ at\ x = 0.$

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57. Let f be a real valued function defined by $f(x) = x^2 + 1$. Find $f'(2)$.

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58. Find the derivative of $f(x) = 2x^2 + 3x - 5$ at $x = -1$. Also, prove that $f'(0) + 3f'(-1) = 0$.

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59. Find the derivative of $f(x) = 3x \text{ at } x = 2$.

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60. Find the derivative of $f(x) = x^2 - 2 \text{ at } x = 10$

A. 10

B. 20

C. 100

D. 98

Answer: B

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61. Find the derivative of $f(x) = 99x \backslash \text{at} \backslash x = 100$

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62. Find the derivative of $f(x) = \cos x \backslash \text{at} \backslash x = 0$

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63. Find the derivative of $f(x) = x \backslash \ at \backslash \ x = 1$

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64. Find the derivative of the function at the indicated point: $\sin x \; at \; x = \frac{\pi}{2}$

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65. Find the derivative of the following function at the indicated point: $x \backslash \quad at \backslash \quad x = 1$

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66. Find the derivative of the following function at the indicated point: $2\cos x \backslash \quad at \backslash \quad x = \backslash \quad \frac{\pi}{2}$

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67. Find the derivative of the following function at the indicated point: $\sin 2x \backslash \quad at \backslash \quad x = \frac{\pi}{2}$

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68. The distance $f(t)$ in metres ived by a particle travelling in a straight line in t seconds is given by $f(t) = t^2 + 3t + 4$. Find the speed of the particle at the end of 2 seconds.

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69. Find the slope of the tangent to the curve $y = x^2$ at $\left(-\frac{1}{2}, \frac{1}{4} \right)$.

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70. Find the derivatives of the following function from first principle: $x^3 - 27$

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71. Find the derivatives of the following function from first principle: $(x-1)(x-2)$

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72. Find the derivatives of the following function from first principle: $\frac{1}{x^2}$

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73. Differentiate the following function with respect to x from first principle: $\sqrt{2x+3}$

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74. Differentiate the following function with respect to x from first principle: $\sqrt{4-x}$

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75. Differentiate the following function with respect to x from first principle: $ax^2 + \frac{b}{x}$

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76. Differentiate the following function with respect to x from first principle: $\frac{2x+3}{3x+2}$

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77. Differentiate the following function with respect to x from first principle: $x^{-3/2}$

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78. Differentiate each of the following from first principle: $\frac{2}{x}$

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79. Differentiate each of the following from first principle: $\frac{x^2+1}{x}$

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80. Differentiate each of the following from first principle: $\frac{x+2}{3x+5}$

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81. Differentiate each of the following from first principle: $x^2 + x + 3$

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82. Differentiate each of the following from first principle: $\left(x^2 + 1\right)(x - 5)$

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83. Differentiate each of the following from first principle: e^{-x}

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84. Differentiate each of the following from first principle: xe^x

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85. Differentiate each of the following from first principle:$\sin(x+1)$

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86. Differentiate each of the following from first principle: $x \cos x$

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87. Differentiate each of the following from first principle: $\frac{1}{\sqrt{x}}$

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88. Differentiate each of the following from first principle: $\frac{x^2 - 1}{x}$

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89. Differentiate each of the following from first principle: kx^n

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90. Differentiate each of the following from first principle: $(x+2)^3$

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91. Differentiate each of the following from first principle: $\sqrt{2x^2+1}$

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92. Differentiate each of the following from first principle: e^{3x}

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93. Differentiate each of the following from first principle: $-x$

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94. Differentiate each of the following from first principle: $\cos\left(x - \frac{\pi}{8}\right)$

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95. Differentiate each of the following from first principle:$\sin(2x - 3)$

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96. Differentiate each of the following from first principle: $\frac{1}{x^3}$

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97. Differentiate each of the following from first principle: $\frac{x+1}{x+2}$

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98. Differentiate each of the following from first principle: $\frac{1}{\sqrt{3-x}}$

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99. Differentiate each of the following from first principle: $x^3 + 4x^2 + 3x + 2$

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100. Differentiate each of the following from first principle: $\frac{2x + 3}{x - 2}$

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101. Differentiate each of the following from first principle: e^{ax+b}

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102. Differentiate each of the following from first principle: $(-x)^{-1}$

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103. Differentiate each of the following from first principle: $x \sin x$

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104. Differentiate each of the following from first principle: $\sqrt{\sin 2x}$

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105. Differentiate each of the following from first principle: $x^2 \sin x$

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106. Differentiate each of the following from first principle: $x^2 e^x$

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107. Differentiate each of the following from first principle: $e^{\sqrt{ax+b}}$

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108. Differentiate each of the following from first principle: $\tan^2 x$

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109. Differentiate each of the following from first principle: $\sin\sqrt{2x}$

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110. Differentiate each of the following from first principle: $\frac{\sin x}{x}$

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111. Differentiate each of the following from first principle: $\sqrt{\sin(3x+1)}$

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112. Differentiate each of the following from first principle: e^{x^2+1}

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113. Differentiate each of the following from first principle: $a^{\sqrt{x}}$

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114. Differentiate each of the following from first principle: $\tan(2x+1)$

A. 2 sec(2x+1)

B. $\sec^2(2x+1)$

C. $2\sec^2(2x+1)$

D. $2\cos^2(2x+1)$

Answer: null

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115. Differentiate each of the following from first principle: $\cos \sqrt{x}$

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116. Differentiate the following from first principle:

$\tan 2x$

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117. Differentiate each of the following from first principle: $\tan \sqrt{x}$

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118. Differentiate each of the following from first principle: $\frac{\cos x}{x}$

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119. Differentiate each of the following from first principle: $\sin x + \cos x$

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120. Differentiate each of the following from first principle: $e^{\sqrt{2x}}$

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121. Differentiate the following from first principle: 3^{x^2}.

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122. Differentiate each of the following from first principle: $\sqrt{\tan x}$

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123. Differentiate each of the following from first principle: $tan2x$

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124. Differentiate the following with respect of x :

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

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125. Differentiate the following with respect of x : $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^3$

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126. Differentiate the following with respect of x : $\frac{\sin(x+a)}{\cos x}$

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127. Differentiate the following with respect of $x : x^4 - 2\sin x + 3\cos x$

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128. Differentiate the following with respect of $x : 3^x + x^3 + 3^3$

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129. Differentiate the following with respect of $x : \frac{x^3}{3} - 2\sqrt{x} + \frac{5}{x^2}$

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130. Differentiate the following with respect of $x : e^{x \log a} + e^{a \log x} + e^{a \log a}$

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131. Differentiate the following with respect of $x : \left(2x^2 + 1\right)(3x + 2)$

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132. Differentiate the following with respect of $x : (\log)_3 x + 3(\log)_e x + 2\tan x$

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133. Differentiate the following with respect of $x : \left(x + \frac{1}{x}\right)\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$

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134. Differentiate the following with respect of $x: \frac{\left(x^3+1\right)(x-2)}{x^2}$

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135. Differentiate the following with respect of $x: a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + \ + a_{n-1} x + a_n.$

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136. Differentiate the following with respect of $x: \frac{(x+5)\left(2x^2-1\right)}{x}$

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137. Differentiate the following with respect of $x : \cos(x + a)$

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138. If $y = \left(\frac{\sin x}{2} + \frac{\cos x}{2}\right)^2$, fin d $\frac{dy}{dx} at x = \frac{\pi}{6}$

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139. If

$$\ y = \left(\frac{2 - 3\cos x}{\sin x} \right), \ f \in d\frac{dy}{dx} \ at \ x = \frac{\pi}{4}$$

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140. Differentiate the following with respect of $x : \frac{2x^2 + 3x + 4}{x}$

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141. Differentiate the following with respect of $x : \frac{a\cos x + b\sin x + c}{\sin x}$

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142. Differentiate the following with respect of $x : 2\sec x + 3\cot x - 4\tan x$

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143. Differentiate the following with respect of $x : \frac{1}{\sin x} + 2^{x+3} + \frac{4}{\log_x 3}$

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144. Differentiate the following with respect of $x : \log\left(\frac{1}{\sqrt{x}}\right) + 5x^a - 3a^x + \sqrt[3]{x^2} + 6\sqrt[4]{x^{-3}}$

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145. Differentiate the following with respect of $x : \frac{\cos(x-2)}{\sin x}$

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146. Find the rate of at which the function $f(x) = x^4 - 2x^3 + 3x^2 + x + 5$ changes with respect to x.

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147. If $y = \frac{2x^9}{3} - \frac{5}{7}x^7 + 6x^3 - x,$ find $\frac{dy}{dx} at\ x = 1.$

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148. For the function $f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \ldots + \frac{x^2}{2} + x + 1$. Prove that $f'(1) = 100f'(0)$.

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149. Differentiate the following with respect of $x : x \sin x$

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150. Differentiate the following with respect of $x : e^x \sin x + x^n \cos x$

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151. Differentiate the following with respect of $x : (x + \sec x)(x - \tan x)$

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152. Differentiate the following with respect of $x : \left(x^2 + 1\right)\cos x$

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153. Differentiate the following with respect of $x : \frac{x^3 \sin x}{\cos x}$

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154. Differentiate the following with respect of $x : e^x (x + \log x)$

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155. Differentiate the following with respect of $x : (x + \cos x)(x - \tan x)$

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156. Differentiate the following with respect of $x : \left(ax^2 + \sin x\right)(p + q\cos x)$

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157. Using mathematical induction prove that : $\frac{d}{dx}(x^n) = nx^{n-1}$ for all $n \in N$.

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158. Differentiate the following function with respect of $x : x^3 \sin x$

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159. Differentiate the following function with respect of $x : x^n \tan x$

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160. Differentiate the following function with respect of x: $\sin x \cos x$

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161. Differentiate the following function with respect of x : $x^5 e^x + x^6 \log x$

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162. Differentiate the following function with respect of x : $\left(1 + x^2\right) \cos x$

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163. Differentiate the following function with respect of x : $e^x \log \sqrt{x} \tan x$

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164. Differentiate the following function with respect of x : $x^5\left(3-6x^{-9}\right)$

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165. Differentiate the following function with respect of x : $\frac{ax+b}{cx+d}$

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166. Differentiate the following function with respect of x : $x^3 e^x$

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167. Differentiate the following function with respect of x : $x^n \log_a x$

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168. Differentiate the following function with respect of x : $\frac{2^x \cot x}{\sqrt{x}}$

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169. Differentiate the following function with respect of x: $\frac{\sin x + \cos x}{\sin x - \cos x}$

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170. Differentiate the following function with respect of x : $\sin^2 x$

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171. Differentiate the following function with respect of x: $x^3\ e^x\ \cos x$

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172. Differentiate the following function with respect of $x \backslash \quad : x^{-4}\left(3 - 4x^{-5}\right)$

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173. Differentiate the following function with respect of x : $\left(x^3+x^2+1\right)\sin x$

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174. Differentiate the following function with respect of x: $x^2 \sin x \log x$

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175. Differentiate the following function with respect of x : $(1-2\tan x)(5+4\sin x)$

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176. Differentiate the following function with respect of x : $(\log)_{x^2} x$

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177. Differentiate the following function with respect of x : $\frac{x^2 \cos\left(\frac{\pi}{4}\right)}{\sin x}$

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178. Differentiate the following function with respect of x : $\left(2x^2 - 3\right)\sin x$

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179. Differentiate the following function with respect of $x : x^{-3}(5 + 3x)$

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180. Differentiate in two ways, using product rule and otherwise, the function $(1 + 2\tan x)(5 + 4\cos x)$ .Verify that the answer are the same.

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181. Differentiate each of the following functions by the product rule and the other method and verify that answer from both the methods is the same.

(i) $\left(3x^2+2\right)^2$

(ii) $(x+2)(x+3)$

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182. Differentiate the following function by the product rule and the other method and verify

that answer from both the methods is the same :

$(3\sec x - 4\operatorname{cosec} x)(-2\sin x + 5\cos x)$

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183. Differentiate the following function with respect of x : $\frac{e^x}{1+\sin x}$

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184. Differentiate the following function with respect of x : $\frac{\sin x + \cos x}{\sin x - \cos x}$

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185. Differentiate the following function with respect of x : $\frac{x+\sin x}{x+\cos x}$

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186. Differentiate the following function with respect of x : $\frac{\sec x-1}{\sec x+1}$

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187. Differentiate the following function with respect of x : $\frac{x^2+1}{x+1}$

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188. Differentiate the following function with respect of x : $\frac{1}{ax^2+bx+c}$

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189. Differentiate the following function with respect of x : $\frac{x\tan x}{secx+tanx}$

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190. Differentiate the following function with respect of x : $\frac{\sin x - x \cos x}{x \sin x + \cos x}$

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191. Differentiate the following function with respect of x : $\frac{a + \sin x}{1 + a \sin x}$

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192. Differentiate the following function with respect of x : $\frac{x}{1+\tan x}$

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193. Differentiate the following function with respect of x : $\frac{\sec x-1}{\sec x+1}$

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194. Differentiate the following function with respect of x : $\frac{x^n}{\sin x}$

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195. Differentiate the following function with respect of x : $\frac{x^2+1}{x+1}$

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196. Differentiate the following function with respect of x : $\frac{ax^2+bx+c}{px^2+qx+r}$

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197. Differentiate the following function with respect of x : $\frac{e^x}{1+x^2}$

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198. Differentiate the following function with respect of x : $\frac{x \sin x}{1+\cos x}$

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199. Differentiate the following function with respect of 2-x+1)/(x^2+x+1)`

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200. Differentiate the following function with respect of x : $\frac{1+\log x}{1-\log x}$

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201. Differentiate the following function with respect of x : $\frac{a+b\sin x}{c+d\cos x}$

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202. Differentiate the following function with respect of x : $\frac{x^5 - \cos x}{\sin x}$

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203. Differentiate the following function with respect of x : $\frac{ax + b}{px^2 + qx + r}$

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204. Differentiate the following function with respect of x : $\frac{x}{1 + \tan x}$

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205. Differentiate the following function with respect of x : $\frac{2^x \cot x}{\sqrt{x}}$

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206. Differentiate the following function with respect of x : $\sec\left(\tan\left(\sqrt{x}\right)\right)$

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207. Differentiate the following function with respect of x : $\frac{1+3^x}{1-3^x}$

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208. Differentiate the following function with respect of x : $\frac{4x+5\sin x}{3x+7\cos x}$

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209. Differentiate the following function with respect of x : $\frac{px^2+qx+r}{ax+b}$

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210. Differentiate the following function with respect of x : $\frac{x+\cos x}{\tan x}$

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211. Differentiate the function with respect of x : $\frac{1}{a\,x^2+b\,x+c}$

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212. Write the value of $\lim_{x \to c} \frac{f(x) - f(c)}{x - c}$.

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213. Write the value of $\lim_{x \to a} \frac{xf(a) - af(x)}{x - a}$.

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214. If $x < 2$, then write the value of $\frac{d}{dx}\left(\sqrt{x^2 - 4x + 4}\right)$.

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215. If $\frac{\pi}{2} < x < \pi$, then find $\frac{d}{dx}\left(\sqrt{\frac{1+\cos 2x}{2}}\right)$

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216. Write the value of $\frac{d}{dx}(x\,|x|)$.

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217. Write the value of $\frac{d}{dx}\{(x+|x|)|x|\}$.

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218. If $f(x) = |x| + |x-1|$, write the value of $\frac{d}{dx}(f(x))$.

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219. Write the value of the derivative of $f(x) = |x-1| + |x-3|$ at $x = 2$.

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220. If $f(x) = \frac{x^2}{|x|}$, write $\frac{d}{dx}(f(x))$

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221. Write the value of $\frac{d}{dx}(\log|x|)$.

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222. If $f(1) = 1, f'(1) = 2,$ then write the value of $\lim_{x \to 1} \frac{\sqrt{f(x)} - 1}{\sqrt{x} - 1}$

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223. Write the derivative of $f(x) = 3|2 + x|$ at $x = -3$.

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224. If $|x| < 1$ and $y = 1 + x + x^2 + x^3 + \ldots$, then write the value of $\frac{dy}{dx}$.

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225. Let $f(x) = x - [x], x \in \mathbb{R}$, then $f'\left(\frac{1}{2}\right)$ is

a. $\frac{3}{2}$ b. 1 c. 0 d. -1

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226. If $f(x) = \frac{x-4}{2\sqrt{x}}$, then $f'(1)$ is a. $\frac{5}{4}$ b. $\frac{4}{5}$ c. 1 d. 0

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227. If $y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$, then $\frac{dy}{dx} =$ a. $y+1$ b. $y-1$ c. y d. y^2

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228. If

$f(x) = 1 - x + x^2 - x^3 + \ldots - x^{99} + x^{100}$,

then $f'(1)$ equals a. 150 b. -50 c. -150 d. 50

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229. If $y = \frac{1 + \frac{1}{x^2}}{1 - \frac{1}{x^2}}$, then $\frac{dy}{dx}$= a. $-\frac{4x}{(x^2 - 1)^2}$ b. $-\frac{4x}{x^2 - 1}$ c. $\frac{1 - x^2}{4x}$ d. $\frac{4x}{x^2 - 1}$

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230. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then $\frac{dy}{dx}$ at $x = 1$ is a. 1 b. $\frac{1}{2}$ c. $\frac{1}{\sqrt{2}}$ d. 0

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231. If $f(x) = x^{100} + x^{99} + \ldots + x + 1,$ then $f'(1)$ is equal to a. 5050 b. 5049 c. 5051 d. 50051

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232. If $f(x) = 1 + x + \frac{x^2}{2} + \ldots + \frac{x^{100}}{100},$ then $f'(1)$ is equal to a. $\frac{1}{100}$ b. 100 c. 50 d. 0

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233. if $y = \frac{\sin x + \cos x}{\sin x - \cos x}$, then $\frac{dy}{dx}$ at x=0 is equal to

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234. If $y = \frac{\sin(x+9)}{\cos x}$, then $\frac{dy}{dx}$ at x = 0 is: a. $\cos 9$ b. $\sin 9$ c. 0 d. 1

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235. If $f(x) = \frac{x^n - a^n}{x - a}$, then $f'(a)$ is a. 1 b. $\frac{1}{2}$ c. 0 d. does not exist

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236. If $f(x) = x \sin x$, then $f'\left(\frac{\pi}{2}\right)$ is a. $\frac{1}{2}$ b. 1 c. 0 d. -1

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