



MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

DERIVATIVES

Others

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 : $(a x+b)^n(c x+d)^m$

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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. $\frac{d}{dx}((\log)_a x) = \frac{1}{x(\log)_e a}$

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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 $x^2 \cos x$ from first principles .



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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 integration of $\log x$.



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

A. $\frac{a}{2\sqrt{ax + b}}$

B. $\frac{a}{\sqrt{ax + b}}$

C. $\frac{1}{2\sqrt{ax + b}}$

D. $\frac{a}{2\sqrt{ax - b}}$

Answer: A



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14. Differentiate the following functions with respect to x from first principles: $\sin x^2$



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15. Differentiate xe^n by first principle



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



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



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18. The differentiation of $\cot x$ with respect to x is $-\operatorname{cosec}^2 x$ i.e. $\frac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$



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19. What is the differentiation of $\sec x$ with respect to x .



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20. The differentiation of $\cos ecx$ with respect to x is $\text{cosec}x \cot x$. i.e.

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



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21. The differentiation of e^x with respect to ξse^x .

$$\text{i.e. } \frac{d}{dx}(e^x) = e^x$$



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22. Differentiate the following functions with respect to x : (i) \log_x (ii) $e^{3 \log x}$ (iii) $5e^x$ (iv) $9(3^x)$



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23. 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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24. Differentiate the following functions with

respect to x : $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2$



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25. Differentiate the following functions with

respect to x : $\frac{3x}{x + \tan x}$



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26. Differentiate the following functions with

respect to x : $\frac{10^x}{\sin x}$



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27. Differentiate the following functions with

respect to x : $x^2e^x \log x$



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28. Differentiate the following functions with

respect to x (i) $\frac{2x + 3}{x^2 - 5}$ (ii) $\frac{x + 3}{x^2 + 1}$



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



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



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31. Differentiate the following functions with respect to x : $x^4(5 \sin x - 3 \cos x)$



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32. Differentiate the following functions with respect to x : $(x \sin x + \cos x)(e^x + x^x + \log x)$



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33. Differentiate the following functions with

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



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34. Differentiate the following functions with

respect to x : $\frac{e^x - \tan x}{\cot x - x^n}$



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35. The differentiation of $\cos x$ with respect to

x is $-\sin x$. i.e. $\frac{d}{dx}(\cos x) = -\sin x$



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36. The differentiation of $s \in x$ with respect to

$$\xi s \cos x \cdot \text{i.e. } \frac{d}{dx}(\sin x) = \cos x$$



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



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38. Find the derivative of $\sin x^3$ from first principles.



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39. The differentiation of $y=a^x$.



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



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



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



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



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44. If $f(x)$ and $g(x)$ are differentiable 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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45. If $f(x)$ and $g(x)$ 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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46. If u , v and w are functions of x , then show that

$$\frac{d}{dx} (uvw) = \frac{du}{dx} vw + u \frac{dv}{dx} w + uv \frac{dw}{dx} \quad \text{in two}$$

ways - first by repeated application of product rule, second by logarithmic differentiation.



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47. Differentiation of a constant function is zero

i.e., $\frac{d}{dx}(c) = 0.$



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

What is $f(2)$?



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49.

Find

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



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



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



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



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



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



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55. Differentiate the following functions with

respect to x from first principles: $\frac{1}{ax + b}$



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56. Find the derivative of

$f(x) = k$ at $x = 0$ and $x = 5$.



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



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58. Let f be a real valued function defined by

$f(x) = x^2 + 1$. Find $f'(2)$.



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59. 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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60. Find the derivative of $f(x) = 3x$ at $x = 2$.



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61. Find the derivative of

$$f(x) = x^2 - 2 \text{ at } x = 10$$



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62. Find the derivative of

$$f(x) = 99x \text{ at } x = 100$$



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63. Find the derivative of $f(x) = \cos(x)$

at $x = 0$



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64. Find the derivative of $f(x) = x$ at $x = 1$



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



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66. Find the derivative of the following function at the indicated point: x^2 at $x = 1$



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

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

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69. The distance $f(t)$ in metres covered 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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70. Find the slope of the tangent to the curve

$$y = x^2 \text{ at } \left(-\frac{1}{2}, \frac{1}{4} \right).$$



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71. Find the derivatives of the following function

from first principle: $x^3 - 27$



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



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



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



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



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



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77. Differentiate each of the following from first

principle: $\frac{x^2 + 1}{x}$



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78. Differentiate each of the following from first

principle: $\frac{x + 2}{3x + 5}$



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79. Differentiate each of the following from first

principle: $x^2 + x + 3$



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80. Differentiate each of the following from first

principle: $(x^2 + 1)(x - 5)$



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81. Differentiate each of the following from first

principle: e^{-x}



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82. Differentiate: xe^x from the first principles.



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



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

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85. Differentiate $\frac{1}{\sqrt{x}}$ from the first principle.

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

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



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



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89. Differentiate each of the following from first

principle: $\sqrt{2x^2 + 1}$



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90. Differentiate e^{3x} from the first principle.



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91. Differentiate each of the following from first

principle: $-x$



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



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



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94. Differentiate $\frac{1}{x^3}$ from the first principle.



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95. Differentiate $\frac{x + 1}{x + 2}$ from first principle.



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96. Differentiate each of the following from first

principle: $\frac{1}{\sqrt{3 - x}}$



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97. Differentiate each of the following from first

principle: $x^3 + 4x^2 + 3x + 2$



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98. Differentiate each of the following from first

principle: $\frac{2x + 3}{x - 2}$



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99. Differentiate each of the following from first

principle: $e^{ax + b}$



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



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



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102. Differentiate each of the following from first

principle: $\sqrt{\sin 2x}$



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103. Differentiate each of the following from first

principle: $x^2 \sin x$



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104. Differentiate each of the following from first

principle: $e^{\sqrt{ax+b}}$



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



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



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107. Differentiate each of the following from first

principle: $\frac{\sin x}{x}$



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108. Differentiate each of the following from first

principle: $\sqrt{\sin(3x + 1)}$



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109. Differentiate each of the following from first

principle: $e^{x^2 + 1}$



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110. Differentiate $\cos(x)$ by first principle.



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111. Differentiate the following from first principle:

$\tan 2x$



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

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113. Differentiate $\log \sin(x)$ by first principle.

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

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



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116. Differentiate the following from first principle: $3x^2$.



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117. Differentiate $\sqrt{\tan x}$ from first principle.



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118. Differentiate the following with respect of x :

$$(x^2 - 3x + 2)(x + 2)$$



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119. Differentiate the following with respect of x :

$$(x^2 + 1/x^2)$$



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120. Differentiate the following with respect of

$$x: \frac{\sin(x + a)}{\cos x}$$



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121. Differentiate the following with respect of

$$x: x^4 - 2 \sin x + 3 \cos x$$



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122. Differentiate the following with respect of

$$x: 3^x + x^3 + 3^3$$



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123. Differentiate the following with respect of

$$x: \frac{x^3}{3} - 2\sqrt{x} + \frac{5}{x^2}$$



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124. Differentiate the following with respect of

$$x: e^{x \log a} + e^{a \log x} + e^{a \log a}$$



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125. Differentiate the following with respect of

$$x : (2x^2 + 1)(3x + 2)$$



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126. Differentiate the following with respect of

$$x : (\log)_3 x + 3(\log)_e x + 2 \tan x$$



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127. Differentiate $\sqrt{x}+1/(\sqrt{x})$



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128. Differentiate the following with respect of

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



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129. Differentiate the following with respect of

$$x: a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \dots + a_{n-1}x + a_n.$$



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130. Differentiate the following with respect of

$$x: \frac{(x + 5)(2x^2 - 1)}{x}$$



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131. Differentiate the following with respect of

$$x: \cos(x + a)$$



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132. If $y = \left(\sin\left(\frac{x}{2}\right) + \cos\left(\frac{x}{2}\right) \right)^2$, $\frac{dy}{dx}$ at

$$x = \frac{\pi}{6}$$



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133. If $y = \frac{2-3\cos x}{\sin x}$, find $\frac{dy}{dx}$ at $x = \pi/4$



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134. Differentiate the following with respect of

$$x: \frac{2x^2 + 3x + 4}{x}$$



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135. Differentiate the following with respect of

$$x: \frac{a \cos x + b \sin x + c}{\sin x}$$



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136. Differentiate the following with respect of

$$x: 2 \sec x + 3 \cot x - 4 \tan x$$



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137. Differentiate the following with respect of

$$x: \frac{1}{\sin x} + 2^{x+3} + \frac{4}{\log_x 3}$$



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138. 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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139. Differentiate the following with respect of

$$x : \frac{\cos(x - 2)}{\sin x}$$



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140. 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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141. 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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142. For the function

$$f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \dots + \frac{x^2}{2} + x + 1 .$$
 Prove

that $f'(1) = 100f'(0)$.



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143. Differentiate the following with respect of

$x : x \sin x$



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144. Differentiate the following with respect of

$$x : e^x \sin x + x^n \cos x$$



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145. Differentiate the following with respect of

$$x : (x + \sec x)(x - \tan x)$$



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146. Differentiate the following with respect of

$$x : (x^2 + 1) \cos x$$



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147. Differentiate the following with respect of

$$x : \frac{x^3 \sin x}{\cos x}$$



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148. Differentiate the following with respect of

$$x : e^x (x + \log x)$$



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149. Differentiate the following with respect of

$$x : (x + \cos x)(x - \tan x)$$



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150. Differentiate the following with respect of

$$x : (ax^2 + \sin x)(p + q \cos x)$$



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151. Using mathematical induction prove that :

$$\frac{d}{dx}(x^n) = nx^{n-1} \text{ for all } n \in \mathbb{N}.$$



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



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



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



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



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



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



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



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159. Differentiate the following function with

respect of x : $f(x) = \frac{ax + b}{cx + d}$



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160. Differentiate the following function with

respect of x : $x^3 e^x$



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161. Differentiate the following function with

respect of x : $x^n \log_a x$



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162. Differentiate the following function with

respect of x : $\frac{2^x \cot x}{\sqrt{x}}$



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163. Differentiate the following function with

respect of x : $(x \sin x + \cos x)(x \cos x - \sin x)$



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



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



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166. Differentiate the following function with respect of x : $x^{-4} (3 - 4x^{-5})$



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



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



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169. Differentiate the function with respect of

$$x : (1 - 2 \tan x)(5 + 4 \sin x)$$



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170. Differentiate the following function with

$$\text{respect of } x : (\log)_{x^2} x$$



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171. Differentiate the following function with

respect of x : $\frac{x^2 \cos\left(\frac{\pi}{4}\right)}{\sin x}$



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172. Differentiate the following function with

respect of x : $(2x^2 - 3)\sin x$



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



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174. 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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175. Differentiate the following functions by the product rule and the other method and verify that answer from both the methods is the same:

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



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176. Differentiate the following function by the product rule and the other method and verify that answer from both the methods is the same :

$$(3 \sec x - 4 \cos ecx)(-2 \sin x + 5 \cos x)$$



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177. Differentiate the following function with

respect of x : $\frac{e^x}{1 + \sin x}$



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178. Differentiate the following function with

respect of x : $\frac{\sin x + \cos x}{\sin x - \cos x}$



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179. Differentiate the following function with

respect of x : $\frac{x + \sin x}{x + \cos x}$



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180. Differentiate the following function with

respect of x : $\frac{\sec x - 1}{\sec x + 1}$



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181. Differentiate the following function with

respect of x : $\frac{x^2 + 1}{x + 1}$



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182. Differentiate the following function with

respect of x :
$$\frac{1}{ax^2 + bx + c}$$



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183. Differentiate the following function with

respect of x :
$$\frac{x \tan x}{\sec x + \tan x}$$



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184. Differentiate the following function with

respect of x :
$$\frac{\sin x - x \cos x}{x \sin x + \cos x}$$



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185. Differentiate the following function with

respect of x :
$$\frac{a + \sin x}{1 + a \sin x}$$



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186. Differentiate the function with respect of

x :
$$\frac{x}{1 + \tan x}$$



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187. Differentiate the following function with

respect of x : $\frac{\sec x - 1}{\sec x + 1}$



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188. Differentiate the following function with

respect of x : $\frac{x^n}{\sin x}$



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189. Differentiate the following function with

respect of x : $\frac{2x - 1}{x^2 + 1}$



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190. Differentiate the following function with

respect of x : $\frac{ax^2 + bx + c}{px^2 + qx + r}$



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191. Differentiate the following function with

respect of x : $\frac{e^x}{1 + x^2}$



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192. Differentiate the following function with

respect of x :
$$\frac{x \sin x}{1 + \cos x}$$



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193. Differentiate the following function with

respect of x :
$$\frac{x^2 - x + 1}{x^2 + x + 1}$$



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194. Differentiate the following function with

respect of x :
$$\frac{1 + \log x}{1 - \log x}$$



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195. Differentiate the following function with

respect of x :
$$\frac{a + b \sin x}{c + d \cos x}$$



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196. Differentiate the function with respect of

x :
$$\frac{x^5 - \cos x}{\sin x}$$



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197. Differentiate the following function with

respect of x :
$$\frac{ax + b}{px^2 + qx + r}$$



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198. Differentiate the following function with

respect of x :
$$\frac{x}{1 + \tan x}$$



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199. Differentiate the following function with respect of x :

$$\frac{2^x \cot x}{\sqrt{x}}$$

A. $\frac{2^x}{\sqrt{x}} \left(\log 2 \cot x - \cos ec^2 x - \frac{\cot x}{2x} \right)$

B.

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

C. $\frac{2^x}{\sqrt{x}} \left(\log 2 \cot x - \cos ec^2 x - \frac{\cot x}{x^2} \right)$

D. None of these

Answer: A



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200. Differentiate the following function with

respect of x :
$$\frac{\sqrt{a} + \sqrt{x}}{\sqrt{a} - \sqrt{x}}$$



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201. Differentiate the following function with

respect of x :
$$\frac{1 + 3^x}{1 - 3^x}$$



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202. Differentiate the following function with

respect of x : $\frac{4x + 5 \sin x}{3x + 7 \cos x}$



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203. Differentiate the following function with

respect of x : $\frac{px^2 + qx + r}{ax + b}$



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204. Differentiate the following function with

respect of x : $\frac{x + \cos x}{\tan x}$



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205. Differentiate the following function with

respect of x :
$$\frac{1}{ax^2 + bx + c}$$



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



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207. It is given that $f'(a)$ exists, then

$\lim_{x \rightarrow a} \frac{xf(a) - af(x)}{x - a}$ is equal to:



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208. If $x < 2$, then write the value of

$$\frac{d}{dx} \left(\sqrt{x^2 - 4x + 4} \right).$$



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209. If $\frac{\pi}{2} < x < \pi$, then find

$$\frac{d}{dx} \left(\sqrt{\frac{1 + \cos 2x}{2}} \right)$$



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



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



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



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



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



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



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216. If $f(1) = 1$, $f'(1) = 2$, then write the value

of $\lim_{x \rightarrow 1} \frac{\sqrt{f(x)} - 1}{\sqrt{x} - 1}$



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



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



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219. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = \frac{x^2 - 8}{x^2 + 2}$. Then f is



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220. 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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221. If $y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$, then

$\frac{dy}{dx} =$ a. $y + 1$ b. $y - 1$ c. y d. y^2



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222.

If

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

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



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223. 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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224. 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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225. If $f(x) = x^{100} + x^{99} + \dots + x + 1$, then $f'(1)$ is equal to a. 5050 b. 5049 c. 5051 d. 50051



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



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227. 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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228. 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

Answer: A



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229. 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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230. 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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