MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

DERIVATIVES

Question Bank

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1. If $y = \tan^{-1}(x^3)$ then dy/dx=

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2. $y = 1 + x + \dfrac{x^2}{2!} + \dfrac{x^3}{3!} + \ldots . \infty$,then

dy/dx=

   A. x

   B. 1

   C. y

   D. none of these

Answer: C

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3. $f(x) = e^x \cdot g(x), g(0) = 2$ and $g'(0) = 1$

then $f'(0) =$

4. $y = \left(\dfrac{x^a}{x^b}\right)^{a+b} \cdot \left(\dfrac{x^b}{x^c}\right)^{b+c} \cdot \left(\dfrac{x^c}{x^a}\right)^{c+a}$ then

dy/dx=

    A. 0

    B. 1

C. a+b+c

D. (-(a+b+c))

Answer: A

5. if f(x)=$8x^4$ then f'(-1/2)=

A. (-4)

B. (1/2)

C. (-1/2)

D. 4

Answer: A

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6. $y = e^a \log x$ then dy/dx

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7. $f(x) = x^2 + a$ then at $x = a$, $f'(x)$ is

A. 0

B. (1/2)

C. 1

D. 2

Answer: B

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8. Derivative of $\sin x^3$ with respect to x is

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9. $y = \cos^{-1} x^2$ then dy/dx=

10. $\dfrac{d}{dx}\left(x^6 + 6^x\right) =$

A. 12x

B. x+y

C. $6x^5 + 6^x \log_e 6$

D. $6x^5 + x6^{x-1}$

Answer: C

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11. $f(x) = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$ then f'(x)=

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12. $y = \cos^{-1}x^2$ then dy/dx=

13. if $f(x) = x^2 - 6$ then value of f'(6) is

14. $y = \sin 2x + \cos 2x$ what is the value of dy/dx at $x = \dfrac{\pi}{6}$

15. $x = \dfrac{\cos^2(\theta)}{2}$ then $\dfrac{dx}{d\theta}$

A. $\left(\dfrac{1}{2}\right) \cos \theta$

B. $\cos\theta$

C. $\left(-\dfrac{1}{2}\right)\sin 2\theta$

D. $(-\sin\theta)$

Answer: C

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16. $y = b\sin^{-1}ax$ then $\dfrac{dy}{dx} =$

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17. if $f(x) = e^x + 4x$ then $f'(x) =$

18. if $y = \sin 3x$ then $\left(\dfrac{dy}{dx}\right)_{x=0}$ is

19. $f(x) = \log(x^3)$,f'(x)=?

20. If $f(2) = 4, f'(2) = 1,$

$$\underset{x \to 2}{L}t\left(\frac{xf(2) - 2f(x)}{x - 2}\right) = ?$$

21. $y = \sin^{-1}\left(\frac{x}{2}\right) + \cos^{-1}\left(\frac{x}{2}\right)$ then find the value of $\left[\dfrac{dy}{dx}\right]_{x=1}$

22. if $f(x) = x \tan^{-1}(x)$ then find the value of f'(1)=

23. If f(x)=xinx then $f'\left(\dfrac{\pi}{2}\right)$ is equal to

A. 0

B. 1

C. (-1)

D. (1/2)

Answer: B

24. find derivative of $\log 9x^2$

25. It is given that f'(a) exists then $\lim\limits_{x \to a} \left(\dfrac{xf(a) - af(x)}{x - a} \right)$ is equal to

A. f(a)-af'(a)

B. f'(a)

C. (-f'(a))

D. f(a)+af'(a)

Answer: A

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26. Differentiate $10^x \cdot x^{10}$

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27. find derivative of $\left(\cos 2x + x^2 \right)$

28. find derivative of $\dfrac{\sin x + \cos x}{\sqrt{1 + \sin 2x}}$

29. find derivative of $\log\left(\dfrac{x}{2} \right)$

30. find derivative of $\sqrt{x^2 + a^2}$

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31. find derivative of $\left(\tan^{-1} x^2\right)$

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32. find derivative of $\cos ec^{-1} 3x$

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33. find derivative of $\tan^{-1}(4x)$

34. Find $f'(0)$ if $f(x) = \cos^2 x$

35. $\qquad f(x) = x \sin\left(\dfrac{1}{x}\right), x \neq 0 = 0, x = 0$

examine whether f'(0)exists.

36. find $f'(2)$ where f(x)=$3x^2 + 2x$

37. if $f(2) = 4$ and $f'(2) = 2$ then prove that

$$\underset{x \to 2}{L\,t}\frac{2x^2 - 2f(x)}{x - 2} = 4$$

38. if $f(x) = mx + c$ and $f(0) = f'(0) = 1$

then find the value of $f(3)$

39. If y=secx+tanx then prove that

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

40. if $y = x^3$ then prove that $x\dfrac{dy}{dx} - 3y = 0$

41. $y = xe^x$ show that $x\dfrac{dy}{dx} = (1+x)y$

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42. Find the diffrential coefficients of $y = \cos x^0$

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43. If $p = at^2 + bt + c$ find $\left[\dfrac{dp}{dt}\right]_{t=2}$ =?

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44. if $2f(x) + 3f(- x) = x^2 + x + 1$ find

the value of f'(1)

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45. If f(9)=9 ,f'(9)=4, $\underset{x \to 9}{\text{Lt}} \dfrac{\sqrt{f(x)} - 3}{\sqrt{x} - 3} = $?

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46. The function f is differentiable at x=a and its derivative be f'(a) show that

$$\underset{x \to a}{L}t\frac{xf(a) - af(x)}{x - a} = f(a) - af'(a)$$

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47. If $y = \dfrac{x}{x + 2}$ prove that $x\dfrac{dy}{dx} = y(1 - y)$

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48. show that the function

$f(x) = |x - 2| + |x - 3|$ is not differentiable

at x=2 and x=3

49. If $\dfrac{\log(x^2 - y^2)}{x^2 + Y^2} = a$ the prove that

(dy/dx)=y/x

50. prove that $\dfrac{d}{dx}(x^x) = x^x(1 + \log_e x)$

51. $y = x^{x^{x^{- - - - - - \infty}}}$ then prove that

$$\dfrac{dy}{dx} = \dfrac{y^2}{x(1 - y\log x)}$$

52. If $y = \dfrac{\tan^{-1}(5ax)}{a^2 - 6x^2}$ prove that

$$\dfrac{dy}{dx} = \dfrac{3a}{a^2 + 9x^2} + \dfrac{2a}{a^2 + 4x^2}$$

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

show that $\dfrac{dy}{dx} = \dfrac{1}{\sqrt{1-x^2}} - \dfrac{1}{2\left(\sqrt{x-x^2}\right)}$

54. f(x) is differentiable at x=a prove that

$$\underset{x \to a}{L\,t}\,\dfrac{(x+a)f(a) - 2af(x)}{x-a} = f(a) - 2af'(a)$$

55. If y=g{g(x)}, g(0)=0 and g'(0)=2 then find dy/dx at x=0

56. $2f(x) + 3f(-x) = x^2 - x + 1$ then determine f'(1)

57. $x = \sec\theta - \cos\theta, \; y = \sec^n\theta - \cos^n\theta$

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

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58. $y = \tan^{-1}\left(\dfrac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right)$ show

that $\dfrac{dy}{dx} = \dfrac{1}{2\sqrt{1-x^2}}$

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59. f(x)=5x-4

$$(0 < x \leq 1) = 4x^2 - 3x(1 < x < 2) \quad \text{test}$$

whether f(x) is differentiable at x=1

60. find the derivative of x^x

61. Find by the defination the differential coefficient of the following: tanx

62. Find derivative of the following: sec3x

63. Find derivative of the following: $e^{\sqrt{x}}$

64. Find derivative of the following: $\sin^{-1} x$

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65. Find by the definition the differential coefficient of the following: a^x

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66. Find by the definition the differential coefficient of the following: $\log_{10}^{x}$

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67. Find by the definition the differential coefficient of the following: $f(x) = \sin x$

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68. Find by the definition the differential coefficient of the following: $x^3 + 2x$

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69. Find by the definition the differential coefficient of the following: show that $f(x) = |x - 2| + 1$ is not differentiable at x=2

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70. Find by the definition the differential coefficient of the following: If f(x) =1/x then find f'(1)-f'(-1)

71. Find derivative of the following: If $f(x) = (\log x). x$ findf'(x)`

72. Find by the definition the differential coefficient of the following: If $e^x + e^y = e^{x+y}$ find dy/dx

73. Find by the definition the differential coefficient of the following: Let the function f(x) is differentiable at x=1 f(1)=0 and $\underset{h \to 0}{L} t \dfrac{f(1+h)}{h} = 5$ find f'(1)

74. Find by the definition the differential coefficient of the following: If

$$y = \left(\frac{x^b}{x^c}\right)^{b+c} \cdot \left(\frac{x^c}{x^a}\right)^{c+a} \left(\frac{x^a}{x^b}\right)^{a+b}$$

find dy/dx

75. Find by the definition the differential coefficient of the following:

$$y = \sqrt{2x} - \sqrt{\frac{2}{x}} + \frac{x+4}{4-x}$$ dy/dx=?

76. Find the differential coefficient of the following: If $x^p y^q = (x + y)^{p+q}$ then show that dy/dx=y/x

77. Find the differential coefficient of the following: y=xsinx+cosx/xcosx-sinx show that

$$\frac{dy}{dx} = \frac{x^2}{(x \cos x - \sin x)^2}$$

78. Find by the definition the differential coefficient of the following: If $x = \dfrac{1 - \sqrt{y}}{1 + \sqrt{y}}$ prove that $\dfrac{dy}{dx} = \dfrac{4(x - 1)}{(x + 1)^3}$

79. Find by the definition the differential coefficient of the following: if 8f(x)+6f(1/x)=x+5 and $y = x^2 f(x)$ find `[dy/dx]_x=1

80. Find by the definition the differential coefficient of the following:

$$y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots \ldots + \frac{x^n}{n!}$$

show that $\dfrac{dy}{dx} - y + \dfrac{x^n}{n!} = 0$

81. Find by the definition the differential coefficient of the following: If

$$y = \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}} \, \xi n\left(0, \frac{\pi}{2}\right) \cap \left(\frac{\pi}{2}, \pi\right) \quad \text{then}$$

find dy/dx