



MATHS

BOOKS - NAVBODH MATHS (HINGLISH)

DIFFERENTIATION

Theory Question

1. Is every differentiable function continuous?

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2. If $y = f(u)$ is differentiable function of u , and $u = g(x)$ is a differentiable function of x , then proven that $y = f[g(x)]$ is a differentiable function of x

and
$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}.$$

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3. If $y = f(x)$ is a derivable function of x such that the inverse function $x = f^{-1}(y)$ is defined, then show that $\frac{dx}{dy} = \frac{1}{(dy/dx)}$, where $\frac{dy}{dx} \neq 0$.

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4. If $y = f(x)$ and $x = g(y)$, where g is the inverse of f , i.e., $g = f^{-1}$ and if $\frac{dy}{dx}$ and $\frac{dx}{dy}$ both exist and $\frac{dx}{dy} \neq 0$, show that $\frac{dy}{dx} = \frac{1}{(dx/dy)}$.

Hence, (1) find $\frac{d}{dx}(\tan^{-1} x)$

(2) If $y = \sin^{-1} x$, $-1 \leq x \leq 1$, $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$, then show that $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$ where $|x| < 1$.

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5. If x and y are differentiable functions of t , then $\frac{dy}{dx} = \frac{dy/dt}{dx/dt}$, if $\frac{dx}{dt} \neq 0$.

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Ex 1 Solved Examples

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



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2. $y = \sec \sqrt{x}$. Find $\frac{dy}{dx}$

A. $\frac{dy}{dx} = (\sec \sqrt{x} \cdot \tan \sqrt{x})$

B. $\frac{dy}{dx} = \frac{\sec \sqrt{x} \cdot \tan \sqrt{x}}{2\sqrt{x}}$

C. $\frac{dy}{dx} = \frac{\sec \sqrt{x} \cdot \tan \sqrt{x}}{\sqrt{x}}$

D. $\frac{dy}{dx} = \frac{\sec \sqrt{x} \cdot \tan \sqrt{x}}{2}$

Answer: B



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3. $y = \tan^2(\log x^3)$, Find dy/dx



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4. $y = \log(3x^2 + 2x + 1)$, find $\frac{dy}{dx}$



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Ex 2 Solved Examples

1. $y = x^{\tan^{-1}x}$, Find dy/dx



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2. $y = x^x + x^a + a^x + a^a$ Find dy/dx



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3. $\log_x a$.

A. $\frac{-\log a}{a(\log x)^2}$

B. $\frac{-\log x}{x(\log a)^2}$

C. $\frac{\log a}{x(\log x)^2}$

D. $\frac{-\log a}{x(\log x)^2}$

Answer: D



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Ex 3 Solved Examples Find Dy Dx If

1. $y = \log \left[a^{4x} \cdot \left(\frac{x-5}{x+4} \right)^{\frac{3}{4}} \right]$



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$$2. y = \log \left[\frac{x + \sqrt{x^2 + a^2}}{\sqrt{x^2 + a^2} - x} \right]$$

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$$3. y = \log \left[\sin^3 x \cdot \cos^4 x \cdot (x^2 - 1)^5 \right]$$

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Ex 4 Solved Examples Find Dy Dx If

$$1. y = \sqrt{\frac{(2x + 3)^5}{(3x - 1)^3(5x - 2)}} \text{ Find } dy/dx$$

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$$2. y = e^{3x} \cdot \sin^2 x \cdot \log x$$

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Ex 5 Solved Examples Find Dy Dx If

1. $y = x^{\sin x} \cdot (\tan x)^x$

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

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Ex 6 Solved Examples Differentiate The Following W R T X

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

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2. $y = (\log x)^x - x^{\log x}$ find dy/dx



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Ex 7 Solved Examples Differentiate The Following W R T X

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



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



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Ex 8 Solved Examples Differentiate The Following W R T X

1. $y = \tan^{-1}\left(\frac{\sin x}{1 + \cos x}\right)$ Find dy/dx



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



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



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Ex 9 Solved Examples Differentiate The Following W R T X

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



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2. $y = \tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right)$ Find dy/dx



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Ex 10 Solved Examples Differentiate The Following W R T X

1. $y = \tan^{-1}(\sec x + \tan x)$. Then $\frac{dy}{dx} =$



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2. $\cos^{-1}\left(\frac{3 \cos x - 2 \sin x}{\sqrt{13}}\right)$



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3. $y = \sin^{-1}\left(\frac{5x + 12\sqrt{1-x^2}}{13}\right)$



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Ex 11 Solved Examples Differentiate The Following W R T X

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

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

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Ex 12 Solved Examples Differentiate The Following W R T X

$$1. \tan^{-1} \left(\frac{7x}{1-12x^2} \right)$$

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$$2. y = \cot^{-1} \left(\frac{1+15x^2}{2x} \right) \text{ find } dy/dx$$

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3. $y = \tan^{-1}\left(\frac{5x + 1}{3 - x - 6x^2}\right)$ find dy/dx



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4. Find the differentiation of $y = \tan^{-1}\left(\frac{a \cos x - b \sin x}{b \cos x + a \sin x}\right)$



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Ex 13 Solved Examples Find Dy Dx In The Following Cases

1. $x^{\frac{2}{3}} + y^{\frac{2}{3}} = 10^{\frac{2}{3}}$ find $\frac{dy}{dx}$



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2. $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$



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3. $xy = \log(xy)$

A. $\frac{dy}{dx} = -\frac{y}{x}$

B. $\frac{dy}{dx} = \frac{y}{x}$

C. $\frac{dy}{dx} = -\frac{x}{y}$

D. $\frac{dy}{dx} = \frac{x}{y}$

Answer: A



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4. $x \sin y + y \sin x = 0$



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1. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \dots}}}$, $\rightarrow \infty$, prove that $\frac{dy}{dx} = \frac{\cos x}{2y - 1}$

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Ex 15 Solved Examples

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

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Ex 16 Solved Examples

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

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Ex 17 Solved Examples

1. If $\log_{10} \left(\frac{x^3 - y^3}{x^3 + y^3} \right) = 2$, then $\frac{dy}{dx} =$

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Ex 18 Solved Examples

1. If $x^p y^q = (x + y)^{(p+q)}$ then $\frac{dy}{dx} = ?$

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Ex 19 Solved Examples

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

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Ex 20 Solved Examples Find Dy Dx If

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



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2. $x = a \cos t, y = a \sin t.$ find $\frac{dy}{dx}$

A. $\tan t$

B. $-\tan t$

C. $-\cot t$

D. $\cot t$

Answer: C



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Ex 21 Solved Examples

1. If $x = \theta - \sin \theta$ and $y = 1 - \cos \theta$, find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{2}$



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Ex 22 Solved Examples

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



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Ex 23 Solved Examples

1. If $x = e^\theta(\sin \theta - \cos \theta)$, $y = e^\theta(\sin \theta + \cos \theta)$, then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is

A. 1

B. 0

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: A



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Ex 24 Solved Examples

1. If $x = a\left(t - \frac{1}{t}\right)$, $y = a\left(t + \frac{1}{t}\right)$, show that $\frac{dy}{dx} = \frac{x}{y}$



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Ex 25 Solved Examples

1. If $x = a \cos^3 t$, $y = a \sin^3 t$, show that $\frac{dy}{dx} = -\left(\frac{y}{x}\right)^{\frac{1}{3}}$



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Ex 26 Solved Examples

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

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2. $\log(1+x^2)$ w.r.t. $\tan^{-1}x$

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Ex 27 Solved Examples

1. Find $\frac{d^2y}{dx^2}$, if $x = at^2$, $y = 2at$.

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Ex 28 Solved Examples

1. If $ax^2 + 2hxy + by^2 = 0$, show that $\frac{d^2y}{dx^2} = 0$

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Ex 29 Solved Examples

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

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Ex 30 Solved Examples

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

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Examples For Practice

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



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2. $\cos(x^2 e^x)$



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3. $\sqrt{\sin x}$



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4. $y = \sqrt{\cos x} + \sqrt{\cos \sqrt{x}}$ Find y'



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



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6. Derivative of $\log_{e^2}(\log x)$ with respect to x is ...



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7. $x^2 \log \sin x$



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8. $e^{x+2\log x}$

A. $-(x^2 + 2x)e^x$

B. $(x^2 + 2x)e^x$

C. $(x^2 - 2x)e^x$

D. $-(x^2 - 2x)e^x$

Answer: B



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9. x^{2x}



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10. x^{4^x}



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11. $(\sin x)^x$

A. $(\sin x)^x [\cot x + \log \sin x]$

B. $(\sin x)^2 [x \cot x + \log \sin x]$

C. $\sin x [x \cot x + \log \sin x]$

D. $(\sin x)^x [x \cot x + \log \sin x]$

Answer: D



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12. $x^x + a^a$



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Examples For Practice Find Dy Dx If

1. $y = \log \left[e^{3x} \cdot \left(\frac{x-4}{x+3} \right)^{2/3} \right]$, find $\frac{dy}{dx}$



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2. $y = \log \left[3^x \left(\frac{x+1}{x-5} \right)^{\frac{3}{4}} \right]$

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3. $y = \log \left[\frac{x + \sqrt{x^2 + 25}}{\sqrt{x^2 + 25} - x} \right]$, find $\frac{dy}{dx}$

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4. If $y = \sqrt{\frac{(x-3)(x^2+4)}{(3x^2+4x+5)}}$, find $\frac{dy}{dx}$.

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5. $y = \frac{(3x^2+1)\sqrt{1+x^2}}{x^3}$ find dy/dx

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6. $y = \frac{x^3 \tan^5 x}{\tan 4x}$ find dy/dx

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$$7. y = \frac{x^{\cos x}}{x^2 + 4x + 5}$$

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$$8. y = \frac{(\cos x)^x}{1 + x - x^2}$$

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9. If x and y are connected parametrically by the equations given, without eliminating the parameter, Find $\frac{dy}{dx} \cdot x = 2at^2$, $y = at^4$

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$$10. x = \sin \sqrt{t}, y = e^{\sqrt{t}} \text{ find } \frac{dy}{dx}$$

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11. $x = \sin(\log t)$, $y = \log(\sin t)$ find $\frac{dy}{dx}$

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12. $x = a \cot \theta$, $y = b \cos e c \theta$ find $\frac{dy}{dx}$

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13. $x = a \cos^2 t$, $y = a \sin^2 t$ find $\frac{dy}{dx}$

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14. If $x = 2 \cot t + \cos 2t$, $y = 2 \sin t - \sin 2t$, find $\frac{dy}{dx}$ at $t = \frac{\pi}{4}$

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15. If $x = a \sec^3 \theta$ and $y = a \tan^3 \theta$, find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{3}$

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16. $x = \sin^{-1}\left(\frac{2\theta}{1+\theta^2}\right), y = \sec^{-1}\left(\sqrt{1+\theta^2}\right)$

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17. If $x = a\left\{\cos\theta + \log\tan\frac{\theta}{2}\right\}$ and $y = a\sin\theta$, then $\frac{dy}{dx}$ is equal to

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18. If $x = \sqrt{a^{\sin^{-1}((- 1)t)}, y = \sqrt{a^{\cos^{-1}((- 1)t)}}$, show that $\frac{dy}{dx} = -\frac{y}{x}$

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19. $x = 3\cos\theta - 2\cos^3\theta, y = 3\sin\theta - 2\sin^3\theta$ then find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$

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20.

if

$$x = \sin^{-1}\left(\frac{t}{\sqrt{1+t^2}}\right), y = \cos^{-1}\left(\frac{1}{\sqrt{1+t^2}}\right), \text{ show that } \frac{dy}{dx} = 1$$


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$$21. \text{ If } x = \log(1+t^2), y = t - \tan^{-1}t, \text{ show that } \frac{dy}{dx} = \frac{\sqrt{e^x - 1}}{2}$$


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$$22. \text{ If } x = e^{\sin 3t}, y = e^{\cos 3t}, \text{ show that } \frac{dy}{dx} = -\frac{y \log x}{x \log y}$$


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$$23. \text{ If } x^2 + y^2 = t - \frac{1}{t} \text{ and } x^4 + y^4 = t^2 + \frac{1}{t^2} \text{ then prove that}$$

$$\frac{dy}{dx} = \frac{1}{x^3 y}$$


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24. If $x = 2 \cos^4(t + 3)$, $y = 3 \sin^4(t + 3)$, show that $\frac{dy}{dx} = -\sqrt{\frac{3y}{2x}}$

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Examples For Practice Differentiate The Following W R T X

1. $x^{x^3} + (x^3)^x$

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2. $x^{\sin x} + (\sin x)^x$

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3. $x^x + (\tan x)^x$ find $\frac{dy}{dx}$

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4. $e^{\tan x} + (\log x)^{\tan x}$ find $\frac{dy}{dx}$

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

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6. $\cot^{-1}\left(\frac{1}{\sqrt{x}}\right)$

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

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8. $\sec\left(\cos^{-1}\left(\frac{7}{x}\right)\right)$ find dy/dx

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

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10. $\tan^{-1}(\cot 4x)$

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11. $y=x^3 \tan^{-1} x$, Find dy/dx

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12. $y=5^x \cdot \sec^{-1} 2x$ Find dy/dx

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13. $y = \frac{\cos^{-1} x}{x^2 + 1}$ Find dy/dx

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

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15. Differentiate $\tan^{-1}\left\{\sqrt{\frac{1-\cos x}{1+\cos x}}\right\}$, $-\pi$

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

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17. Differentiate each of the following w.r.t. x :

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

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

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$$19. \cos^{-1} \left(\frac{2\sqrt{x}}{1 + x} \right)$$

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$$20. \cos^{-1} \left(\frac{2x}{1 + x^2} \right)$$

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

A. $-\frac{1}{x^2+a^2}$

B. $-\frac{a}{x^2+a^2}$

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

D. $\frac{a}{x^2+a^2}$

Answer: D

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22. $\operatorname{cosec}^{-1}\left(\frac{1}{3x-4x^3}\right)$

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23. $\sin^{-1}\left(\frac{a \sin x + b \cos x}{\sqrt{a^2 + b^2}}\right)$

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24. $y = \cos^{-1}\left(\frac{3 \cos x - 4 \sin x}{5}\right)$, then $\frac{dy}{dx} =$

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25. find $\frac{dy}{dx}$ for $\sin^{-1}\left(\frac{3x + 4\sqrt{1-x^2}}{5}\right)$

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26. find $\frac{dy}{dx}$ for $\tan^{-1}\left[\sqrt{\frac{1 - \sin 4x}{1 + \sin 4x}}\right]$

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27. If $y = \tan^{-1}\frac{(\sqrt{1 + \sin x} + \sqrt{1 - \sin x})}{(\sqrt{1 + \sin x} - \sqrt{1 - \sin x})}$, find $\frac{dy}{dx}$.

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28. $\sin^{-1}\left(\frac{1 - 25x^2}{1 + 25x^2}\right)$ differentiate

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29. If $y = \tan^{-1}\left[\frac{\sqrt{1 + a^2x^2} - 1}{ax}\right]$, then find $\frac{dy}{dx}$

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30. Differentiate $\sin^{-1}\left\{\frac{x}{\sqrt{x^2 + a^2}}\right\}$ with respect to x

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

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$$32. \tan^{-1} \left(\frac{\sqrt{x}(3-x)}{1-3x} \right)$$

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$$33. \cos^{-1} \left(\frac{\sqrt{1+x} - \sqrt{1-x}}{2} \right)$$

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$$34. \tan^{-1} \left(\frac{6x}{1+16x^2} \right)$$

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$$35. \tan^{-1} \left(\frac{6x}{1+16x^2} \right)$$

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36. $\tan^{-1}\left(\frac{\sqrt{x}}{1+20x}\right)$

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37. $\tan^{-1}\left(\frac{a+b\cos x}{b-a\cos x}\right)$

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38. $y = \tan^{-1}\left(\frac{5-x}{6x^2-5x-3}\right)$ find dy/dx

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39. $x\sqrt{x} + y\sqrt{y} = a\sqrt{a}$

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40. If $\sqrt{\frac{y}{x}} + \sqrt{\frac{x}{y}} = 6$, then $\frac{dy}{dx}$ is

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41. $x^2 + xy + Y^2 = 100$

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42. $\cos(xy) = x + y$

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43. Find $\frac{dy}{dx}$ in the following: $\sin^2 x + \cos^2 y = 1$

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44. $y = \sin(x + y)$



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45. $\sin y = \log(x + y)$



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46. $xy + y \sec^{-1} x = 1$



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Examples For Practice Find Dy Dx In Each Of The Following Cases

1. $x + \sqrt{xy} + y = 1$



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2. $\sqrt{x^3 + y^3} = 2axy$



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3. $x^5 \cdot y^7 = (x + y)^{12}$



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4. $(x^2 + y)^{17} = x^8 y^{13}$



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5. $x^y = 2^{x-y}$



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



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7. find $\frac{dy}{dx}$ of $y^y = x \sin y$

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8. $y = xe^{xy}$. find $\frac{dy}{dx}$

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9. if $\log(x + y) = \log(xy) + a$, show that $\frac{dy}{dx} = -\frac{y^2}{x^2}$

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

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

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

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Examples For Practice Differentiate

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

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2. $\cos^{-1}(\sin x)$ w. r. t. $\tan^{-1} x$

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3. $e^x \cos x$ w.r.t. $e^x \sin x$



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4. 3^x w.r.t. $\log_3 x$.



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Examples For Practice Find $D^2 Y$ Dx^2 If

1. Find $\frac{dy}{dx}$, when

$$x = a \cos^3 \theta, y = a \sin^3 \theta$$



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2. $x = 3 \cos t - 2 \cos^3 t, y = 3 \sin t - 2 \sin^3 t$



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3. If $y = \sqrt{x+1} - \sqrt{x-1}$, prove that $(x^2 - 1) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - \frac{y}{4} = 0$

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4. Verify that $y = e^{m \cos^{-1} x}$ satisfies the differential equation

$$(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - m^2y = 0$$

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

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6. If $y = \sin(m \cos^{-1} x)$, show that $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} + m^2y = 0$

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7. If $y = (\sin^{-1} x)^2$, show that $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} = 2$

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

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9.

If

$x = a \sin t - b \cos t, y = a \cos t + b \sin t$, show that $\frac{d^2y}{dx^2} = -\frac{x^2 + y^2}{y^3}$

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Mcq

1. Given $f(x) = \{2x, x < 0, 0, x \geq 0\}$ then $f(x)$ is

A. discontinuous and not differentiable at $x = 0$

B. continuous and differentiable at $x = 0$

C. discontinuous and differentiable at $x = 0$

D. continuous and not differentiable at $x = 0$

Answer:

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2. If $y = \log\left(\frac{1}{1+x}\right)$, then $1 + \frac{dy}{dx} = \dots\dots$

A. xe^{-y}

B. xe^y

C. x

D. $-x$

Answer: B

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3. If $y = (1 + x)(1 + x^2)(1 + x^4)(1 + x^{2^n})$, then find $\frac{dy}{dx}$ at $x = 0$.

A. -1

B. 0

C. 1

D. $2^n \cdot n!$

Answer:



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4. If $y = \log_x a$, $\frac{dy}{dx} = \dots\dots\dots$

A. $\frac{-\log a}{x(\log x)^2}$

B. $x \log a$

C. $\frac{1}{\log_x a}$

D. $\frac{1}{x \log a}$

Answer:

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5. If $y = x^{\sqrt{x}}$ find $\frac{dy}{dx}$

A. $\frac{2 + \log x}{2\sqrt{x}}$

B. $x^{\sqrt{x}} \left[\frac{2 + \log x}{\sqrt{x}} \right]$

C. $x^{\sqrt{x}} \left[\frac{2 + \log x}{2\sqrt{x}} \right]$

D. $x^{\sqrt{x}} \left[\frac{1 + \log x}{2\sqrt{x}} \right]$

Answer: C

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6. If $y = \log \sqrt{\frac{1 - \cos x}{1 + \cos x}}$, show that $\frac{dy}{dx} = \operatorname{cosec} x$.

A. $\sin 2x$

B. $2 \sin. \frac{x}{2}$

C. $\tan x$

D. $\operatorname{cosec} x$

Answer:

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7. If $y = \sin^{-1} x + \sin^{-1} \sqrt{1 - x^2}$ then find $\frac{dy}{dx}$

A. 0

B. 1

C.

D. $-2x$

Answer:

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8. If $y = \sec^{-1}\left(\frac{\sqrt{x} + 1}{\sqrt{x} - 1}\right) + \sin^{-1}\left(\frac{\sqrt{x} - 1}{\sqrt{x} + 1}\right)$, then $\frac{dy}{dx}$ is equal to?

A. x

B. $\frac{1}{x}$

C. 1

D. 0

Answer:

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9. If $x^3y^4 = (x + y)^{n+1}$ and $\frac{dy}{dx} = \frac{y}{x}$, then $n = \dots$

A. 3

B. 4

C. 6

D. 7

Answer:



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10. Derivative of $\tan^3 \theta$ with respect to $\sec^3 \theta$ at $\theta = \frac{\pi}{3}$ is

A. $\frac{3}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $\frac{1}{2}$

D. $-\frac{\sqrt{3}}{2}$

Answer:



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11. If $x = e^{\log(\cos 4\theta)}$, $y = e^{\log(\sin 4\theta)}$, then $\frac{dy}{dx}$ is

A. $-\frac{x}{y}$

B. $\frac{x}{y}$

C. $\frac{y}{x}$

D. $\sqrt{\frac{y}{x}}$

Answer:



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12. If $x^y = e^{x-y}$; then $\frac{dy}{dx}$ is

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

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

C. $\frac{1-\log x}{1+\log x}$

D. $\frac{1-x}{1+\log x}$

Answer:



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13.

If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \dots \infty}}}$, show that $(2y - 1) \cdot \frac{dy}{dx} = \frac{1}{x}$

A. $\frac{1}{y - 1}$

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

C. $\frac{1}{2 \log y}$

D. $\frac{1}{y}$

Answer:



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14. If $y = 1 - \cos \theta$, $x = 1 - \sin \theta$, then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is

A. -1

B. 2

C. $\frac{1}{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: A



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15. If $\sec\left(\frac{x+y}{x-y}\right) = a^2$, then $\frac{d^2y}{dx^2} = \dots\dots$

A. y

B. x

C. $\frac{y}{x}$

D. 0

Answer:



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