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ई-पाठशाला कार्यक्रम

Class 12th

MATHS

सांतत्य तथा अवकलनीयता 02

RAPID REVISION



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प्रश्न यदि $\sin^2 x + \cos^2 y = 1$ हो, तो $\frac{dy}{dx}$ ज्ञात कीजिए।

(2024)



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प्रश्न $\log(\cos \cdot e^x)$ का x के सापेक्ष अवकलन कीजिए।

(2024)

$y = \log(\cos e^x)$

x के सापेक्ष अवकलन करने पर

$\frac{dy}{dx} = \frac{d}{dx}[\log(\cos e^x)]$

$\frac{dy}{dx} = \frac{1}{\cos e^x} \cdot \frac{d}{dx}(\cos e^x)$

$\frac{dy}{dx} = \frac{1}{\cos e^x} \cdot -\sin e^x \frac{d}{dx} e^x$

$\frac{dy}{dx} = \frac{-\sin e^x}{\cos e^x} \cdot e^x$

$= -\tan e^x \cdot e^x$

प्रश्न

यदि $x = 4t, y = \frac{4}{t}$ है तो $\frac{dy}{dx}$ ज्ञात कीजिए।

(2023)

$x = 4t$

$\frac{dx}{dt} = \frac{d}{dt}(4t)$

$= 4\frac{d}{dt}t$

$\frac{dx}{dt} = 4$

$y = \frac{4}{t}$

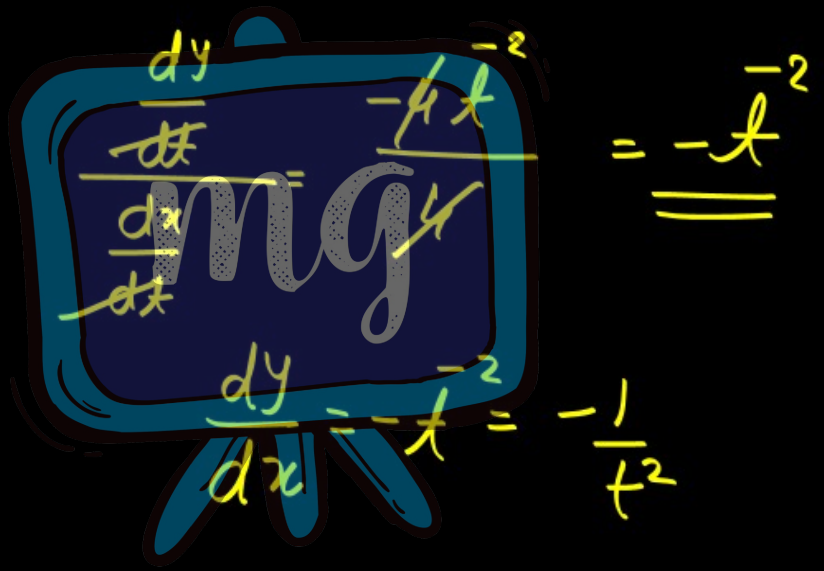
$\frac{dy}{dt} = \frac{d}{dt}\left(\frac{4}{t}\right)$

$\frac{dy}{dt} = 4\frac{d}{dt}t^{-1}$

$\frac{dy}{dt} = -4t^{-2}$

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प्रश्न

x के सापेक्ष $(\log x)^{\cos x}$ का अवकलन कीजिए।

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हल:- माना $y = (\log x)^{\cos x}$

$\{\log m^n = n \log m\}$

दोनों तरफ log लेने पर,

$\log y = \log (\log x)^{\cos x}$

$\log y = \cos x \log (\log x)$

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$$\log y = \cos x \log(\log x)$$

$\frac{d}{dx}(u.v) = u\frac{dv}{dx} + v\frac{du}{dx}$

x के सापेक्ष अवकलन

$$\frac{d}{dx}\log y = \frac{d}{dx}\left(\underset{u}{\cos x}\ \underset{v}{\log(\log x)}\right)$$

$$\frac{1}{y}\frac{dy}{dx} = \cos x \frac{d}{dx}\log(\log x) + \log(\log x)\frac{d}{dx}\cos x$$

$$\frac{1}{y}\frac{dy}{dx} = \cos x \cdot \frac{1}{\log x}\frac{d}{dx}\log x + \log(\log x)(-\sin x)$$

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$$\frac{dy}{dx} = y\left[\frac{\cos x}{x\log x} - \sin x \log(\log x)\right]$$

$$\frac{dy}{dx} = (\log x)^{\cos x}\left[\frac{\cos x}{x\log x} - \sin x \log(\log x)\right]$$

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प्रश्न यदि $y = 500e^{7x} + 600e^{-7x}$ है, तो दर्शाइए कि $\frac{d^2y}{dx^2} = 49y$.

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प्रश्न

सिद्ध कीजिए कि फलन $f(x) = \begin{cases} x^2+3, & \text{यदि } x \neq 0 \\ 1, & \text{यदि } x = 0 \end{cases}$ $x = 0$ पर सतत नहीं है। (2023)

$x = 0$ पर

$f(0) = 1$

$\lim_{x \to 0} f(x) = \lim_{x \to 0} x^2 + 3$

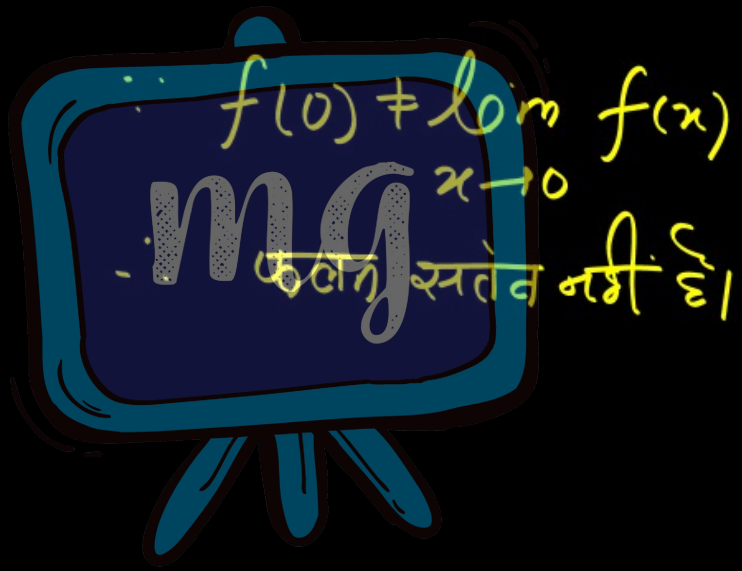
$\lim_{x \to 0} f(x) = (0)^2 + 3 = 3$

$x = a$

$\lim_{x \to a} f(x) = f(a)$

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$f(0) \neq \lim_{x \to 0} f(x)$

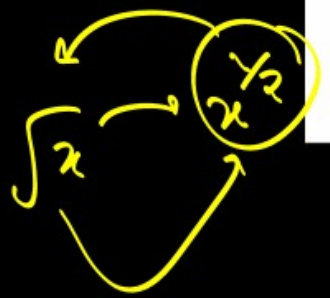
फलन सतत नहीं है।

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प्रश्न $\cos\left(\sqrt{x}\right)$ का x के सापेक्ष अवकलन ..... है।

(2023)



$$y = \cos(\sqrt{x})$$

$$\frac{dy}{dx} = \frac{d}{dx}\cos(\sqrt{x}) = -\sin(\sqrt{x})\frac{d}{dx}\sqrt{x}$$

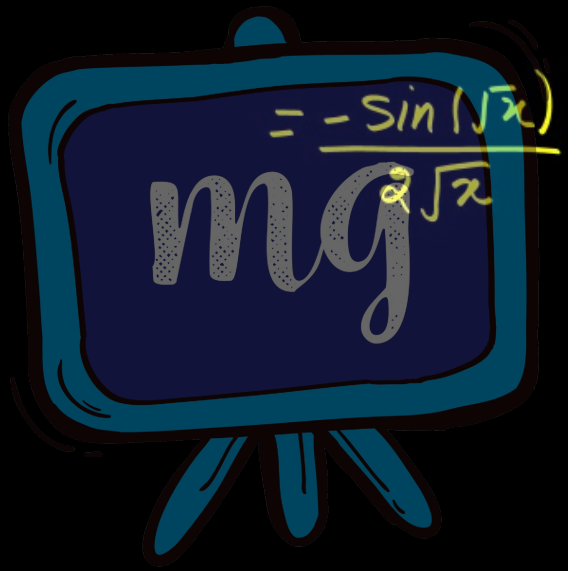
$$= -\sin(\sqrt{x}) \cdot \frac{1}{2} x^{\frac{1}{2}-1}$$

$$= -\sin(\sqrt{x}) \cdot \frac{1}{2} x^{-1/2}$$

$$= -\sin(\sqrt{x}) \cdot \frac{1}{2} x^{1/2}$$

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प्रश्न

यदि $y = x \cdot \log_e x$, तो $\frac{d^2y}{dx^2}$ का मान होगा –

अ) $\frac{1}{1+x}$

ब) $\frac{1}{x}$

स) $\log_e(1+x)$

द) $1 + \log_e x$

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$$y = x \log x$$

$$\frac{dy}{dx} = \frac{d}{dx} x \log x$$

$$= x \frac{d}{dx} \log x + \log x \cdot \frac{d}{dx} x$$

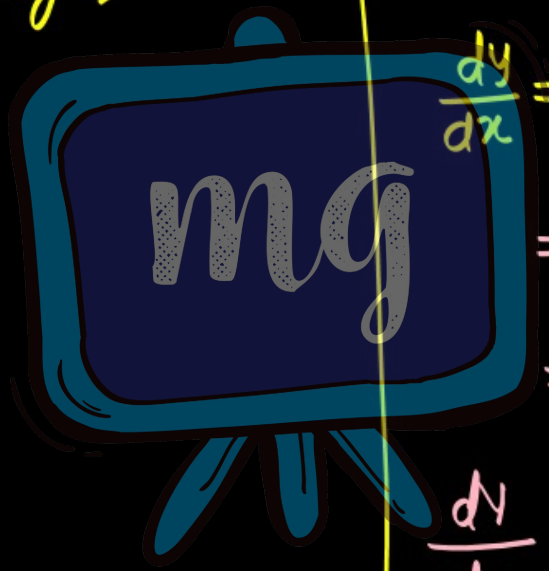
$$= x \cdot \frac{1}{x} + \log x \cdot 1$$

$$\frac{dy}{dx} = 1 + \log x$$

$$\frac{d^2y}{dx^2} = \frac{d}{dx}(1 + \log x)$$

$$= 0 + \frac{1}{x}$$

$$\frac{d^2y}{dx^2} = \frac{1}{x}$$



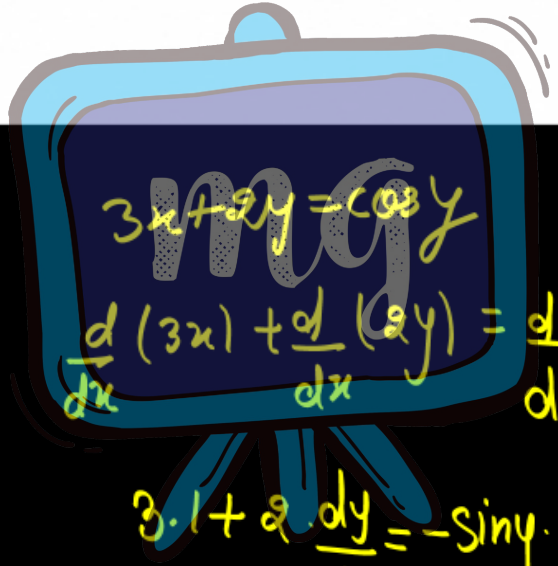
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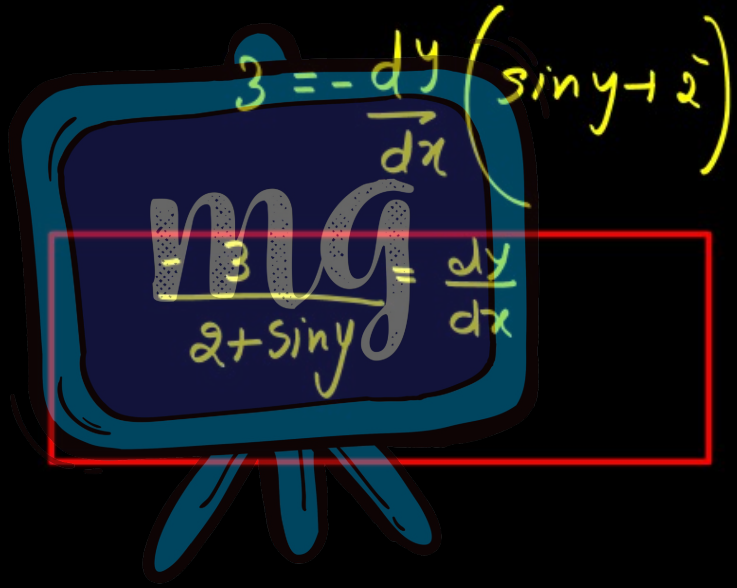
यदि $3x + 2y = \cos y$, तो $\frac{dy}{dx} =$ _____ है।

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प्रश्न दर्शाइए कि फलन $f(x) = x^2, x = 0$ पर सतत है।

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प्रश्न यदि $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right); 0 < x < 1$, तो $\frac{dy}{dx}$ ज्ञात कीजिए।

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प्रश्न यदि x तथा y दिए समीकरण $x = a\left(\cos t + \log \tan \frac{t}{2}\right)$, $y = a \sin t$ द्वारा एक दूसरे से प्राचलिक रूप में संबंधित हों, तो प्राचलों का विलोप किए बिना $\frac{dy}{dx}$ ज्ञात कीजिए ।

(2022)

