

IYAMU UCHENNA PRECIOUS

19/ENG06/031

MECHANICAL ENGINEERING

MAT104

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$y = \frac{2 \cos 3x}{x^3}$

$\ln y = \ln(2 \cos 3x) - \ln(x^3)$

$\frac{1}{y} \cdot \frac{dy}{dx} = \frac{1}{2 \cos 3x} \cdot (-6 \sin 3x) - \frac{1}{x^3} \cdot 3x^2$

$\frac{1}{y} \frac{dy}{dx} = \frac{-6 \sin 3x}{2 \cos 3x} - \frac{3x^2}{x^3}$

$\frac{1}{y} \frac{dy}{dx} = \frac{-3 \tan 3x}{\cos 3x} - \frac{3}{x}$

$\frac{dy}{dx} = y \left[-3 \tan 3x - \frac{3}{x} \right]$

$\frac{dy}{dx} = \frac{2 \cos 3x}{x^3} \left[-3 \tan 3x - \frac{3}{x} \right]$

Let $y = x e^{2x}$

$\frac{dy}{dx} = 2x e^{2x}$

$\frac{d^2y}{dx^2} = 4x e^{2x}$

$4x e^{2x} - 4 [2x e^{2x}] + 4 [e^{2x}]$

$4x e^{2x} - 8x e^{2x} + 4e^{2x} = 0$

Therefore $\frac{dy}{dx} - \frac{y}{x} + \frac{y}{x} = 0$, is true

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DEPT: MECHANICAL ENGINEERING.

Ans $\int e^x \sin x dx$

$u = \sin x, \quad dv = e^x$

$du = \cos x dx, \quad v = e^x$

$\int u dv = uv - \int v du$

$\int e^x \sin x dx = \sin x \cdot e^x - \int e^x \cos x dx$

$\int e^x \sin x dx = e^x \sin x - \int e^x \cos x dx$

$\int e^x \cos x dx$

$u = \cos x, \quad dv = e^x$

$du = -\sin x dx, \quad v = e^x$

$\int u dv = uv - \int v du$

$\int e^x \cos x dx = \cos x \cdot e^x - \int e^x (-\sin x) dx$

$\int e^x \cos x dx = e^x \cos x + \int e^x \sin x dx$

$\int e^x \sin x dx = e^x \sin x - e^x \cos x - \int e^x \sin x dx$

$\int e^x \sin x dx = \frac{e^x \sin x - e^x \cos x}{2}$

$\int e^x \sin x dx = \frac{1}{2} [e^x \sin x - e^x \cos x] + C$

