Uwaeadota Makuochukwu Anthony

Computer Engineering

A/Engo2/077

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

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

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

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

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

$dy/dx = y\left(-3\left(\frac{-3\sin 3x}{\cos 3x} - \frac{3}{x}\right)\right)$

$dy/dx = \frac{2\cos 2x}{x}\left(\frac{-3\sin 3x}{\cos 3x} - \frac{3}{x}\right)$

2) $y = xe^{2x}$

$u = x \quad v = e^{2x}$

$dy/dx = u\,dv/dx + v\,du/dx$

$= x\,de^{2x}/dx + e^{2x}\,dx/dx$

$= x \cdot e^{2x} \cdot 2 + e^{2x} \times 1$

$2e^{2x} + e^{2x}$

$\frac{d^2y}{dx^2} = \frac{2x\,de^{2x}}{dx} + \frac{e^{2x}\,d2x}{dx} +$

$\frac{de^{2x}}{dx}$

$2y \quad 2x^2$

$+$

$= 4xe^{2x} + 2e^{2x} + 2e^{2x}$

$= 4xe^{2x} + 4e^{2x}$

$\frac{d^2y}{dx^2} = \frac{4dy}{dx} + 4y = 0$

$4xe^{2x} + 4e^{2x} - 4(2xe^{2x} + e^{2x}) +$
$4(xe^{2x})$

$4xe^{2x} + 4e^{2x} - 8xe^{2x} + 4e^{2x} + 4xe^{2x}$

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

$\frac{d^2y}{dx^2} - \frac{4dy}{dx} + 4y = 0$

3.) $\int e^x \sin 2x\,dx$

$u = \sin 2x \quad du = e^x$

$du = 2\cos 2x\,dx \quad v = e^x$

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

$\sin 2x(e^x) = \int e^x 2\cos 2x\,dx$

$e^x \sin 2x = \int e^x 2\cos 2x\,dx$

$\int u = 2\cos 2x \quad dv = e^x$

$du = -2\sin 2x \quad v = e^x$

$[2\cos 2x(e^x) - \int e^x(-2\sin 2x)$

$[e^x 2\cos 2x + \sin 2x e^{2x} dx]$