Dzarma Samto 17/eng08/008
Biomedical Engineering

1) Find dy/dx if $y = 2\cos 3x / x^2$

soln

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

Using Quotient Rule

$U = 2\cos 3x$, $V = x^2$

$du/dx = 6\sin 3x$ $dv/dx = 3x^2$

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

$$= \frac{-6x^3\sin 3x - 6x^2\cos 3x}{x^6}$$

$$= \frac{-6x^2(x\sin 3x - 6x^2\cos 3x)}{x^6}$$

$= \sout{-6(6\ x s}$ x^6

$$= \frac{-6(x\sin 3x + \cos 3x)}{4}$$

$=$

$$= \frac{-6x\sin 3x - 6\cos 3x}{x^4}$$

4) If $y = xe^{2x}$, show that differentiation equation $d^2y/dx^2 - \; + dy/dx + 4y = 0$

Soln

$y = xe^{2x}$

Scanned with CamScanner

dx^2

Solve for

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

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

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

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

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

$$= e^x \sin 2x - 2\left[e^x \cos 2x - -2\int e^x \sin 2x\, dx\right]$$

$$= e^x \sin 2x - 2\left[e^x \cos 2x + 2\int e^x \sin 2x\right]$$

$$= e^x \sin 2x - 2e^x \cos 2x - 4\int e^x \sin 2x$$

$$\int e^x \sin 2x + 4\int e^x \sin 2x = e^x \sin 2x - 2e^x \cos 2x$$

$$5\int e^x \sin 2x = e^x \sin 2x - 2e^x \cos 2x + c$$

$$\int e^x \sin 2x = \frac{e^x}{5}(\sin 2x - 2\cos 2x) + c$$