TADESE VICTOR ADEDAMOLA

ELECT/ECLECT ENGINEERING

19/ENG04/055

MAT 104 ASSIGNMENT

(1) $\frac{2\cos 3x}{x^3} = u/v \quad \frac{dy}{dx} = \frac{v\,du/dx - u\,dv/dx}{v^2}$

$du/dx = d(km)/dx \quad k = 2, m = \cos 3x$

$\frac{d(km)}{dx} = k\,dm/dx + m\,dk/dx$

$\frac{dm}{dx} = -3\sin 3x \quad \frac{dk}{dx} = 0$

$\frac{d(km)}{dx} = \frac{du}{dx} = 2(-3\sin 3x) = -6\sin 3x$

$\frac{dv}{dx} = 3x^2$

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

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

2 $y = xe^{2x}$

$\frac{dy}{dx} = x \times 2e^{2x} + e^{2x} \times 1$

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

$$\frac{d^2y}{dx^2} = (x \times 4e^{2x} + 2e^{2x} \times 1) + 2e^{2x}$$

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

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0 \quad -①$$

Substituting values into equ ①

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

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

$$0 = 0$$

(3) NAME: TADESE VICTOR ADEDAMOLA

MATRIC NUMBER: 19/ENG04/055

DEPARTMENT: ELECTRICAL/ELECTRONICS ENGINEERING

4) $\int e^x \sin 2x\,dx = uv - \int v\,du$

$u = \sin 2x$

$\frac{du}{dx} = 2\cos 2x$

$du = 2\cos 2x\,dx$

$dv = e^x$

$v = e^x$

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

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

$\int 2e^x \cos 2x$

$u = \cos 2x$

$du/dx = -2\sin 2x$

$du = -2\sin 2x\,dx$

$dv = 2e^x$

$v = 2e^x$

$2e^x\cos 2x + \int 4e^x \sin 2x\,dx$

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

let $I = \int e^x \sin 2x\,dx$

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

$5I = e^x \sin 2x - 2e^x \cos 2x$

$I = \dfrac{e^x \sin 2x - 2e^x \cos 2x}{5}$

$\int e^x \sin 2x\,dx = \dfrac{e^x \sin 2x - 2e^x \cos 2x}{5}$