IFEOLUWA PROMISE
19/ENG02/021
COMPUTER ENGINEERING
MAT 104.

S/N: 182

① $y = \frac{(2\cos 3x)}{x^3}$

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

$\frac{d}{dx}(\ln y) = \frac{d}{dx}(\ln 2\cos 3x) - \frac{d}{dx}(\ln x^3)$

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

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

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

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

② $y = xe^{2x}$ $u = x$ $v = e^{2x}$

$\frac{dy}{dx} = u\frac{du}{dx} + v\frac{du}{dx}$

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

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

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

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

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

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

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

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

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

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

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

③ NAME: IFEOLUWA PROMISE.
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④ $\int e^x \sin 2x\,dx$

$u = \sin 2x$ $dv = e^x$

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

$v = e^x$

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

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

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

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

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

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

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

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

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

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

Let $P = \int e^x 2\sin 2x\,dx$

$P = e^x 2\sin 2x - e^x 2\cos 2x -$

$2P = e^x 2\sin 2x - e^x 2\cos 2x -$

$P = e^x 2\sin 2x - e^x 2\cos 2x$

$\therefore \int e^x \sin 2x\,dx$

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