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

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

$\frac{4dy}{dx} = 4(ce^{2x} + 2xe^{2x}) = 4e^{2x} + 8xe^{2x}$

$4y = 4(xe^{2x}) = 4xe^{2x}$

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

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

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

3) HARUNA ODUNATO IBRAHIM 19/ENG06/041 Electrical Engineering

4) find the integral of $e^x \sin 2x$ with respect to x

$\int e^x \sin 2x$

$u = e^x \quad dv = \sin 2x, \quad du = e^x dx \quad v = \frac{-\cos 2x}{2}$

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

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

$\int \frac{e^x \cos 2x}{2} = \frac{1}{2}\int e^x \cos 2x$

$\int e^x \cos 2x = \left(\frac{e^x \sin 2x}{2} - \frac{\int e^x \sin 2x}{2}\right)\frac{1}{2}$

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

Let $\int e^x \sin 2x$ be y

$y = \frac{e^x \sin 2x}{4} - \frac{e^x \cos 2x}{2}\frac{4}{4} + c$

$5y = \frac{e^x \sin 2x}{4} - \frac{e^x \cos 2x}{2} + c$

$5y = e^x \sin 2x - 2e^x \cos 2x + C$

$y = \frac{e^x \sin 2x - 2e^x \cos 2x + C}{5}$

~~$\int e^x \sin 2x = \frac{e^x \sin 2x - 2e^x \cos 2x + C}{5}$~~

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

HARUNA ODUNATO IBRAHIM 19/ENG06/041 Electrical Engineering

1) find $\frac{dy}{dx}$ if $y = (2\cos 3x)/x^3$

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

Let $u = 2\cos 3x, \quad v = x^2 \quad \frac{du}{dx} = -6\sin 3x \quad \frac{dv}{dx} = 3x^2$

$\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$

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

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

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

$y = xe^{2x}$

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

Let $u = x, \quad v = e^{2x}, \quad \frac{du}{dx} = 1, \quad \frac{dv}{dx} = 2\cdot e^{2x}$

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

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

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

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