NAME: AARON ABRAHAM DYEM
DEPARTMENT: COMPUTER ENGINEERING
COURSE: MAT 102
MATRIC NO: 19/Eng02/011

ASSIGNMENT

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

Let $u = 2\cos 3x$ and $v = x^3$

$\frac{du}{dx} = -6\sin 3x$ $\qquad \frac{dv}{dx} = 3x^2$

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

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

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

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

2) $y = xe^{2x}$, Show $\frac{d^2y}{dx^2} - 4dy/dx + 4y = 0$

Let $u = x$ and $v = e^{2x}$

$\frac{du}{dx} = 1$ $\qquad \frac{dv}{dx} = 2e^{2x}$

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

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

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

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

$\frac{d^2y}{dx^2} = \frac{dy}{dx}[e^{2x}(2x+1)]$

Let $u = 2x+1$ $\qquad \frac{du}{dx} = 2$

$v = e^{2x}$ $\qquad \frac{dv}{dx} = 2e^{2x}$

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

$= (2x+1)(2e^{2x}) + (e^{2x})(2)$

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

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

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

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

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

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

$8xe^{2x} - 8xe^{2x} = 0$ //

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

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

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

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

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

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

$du = -4\sin 2x \, dx$ $\quad$ $v = e^x$

$2\cos 2x (e^x) - \int e^x . -4\sin 2x \, dx$

$e^x 2\cos 2x - (-4)\int e^x \sin 2x \, dx$

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

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

Let $I =$ [illegible]

$I =$ [illegible]

[illegible]

[illegible]

$I = \frac{[illegible]}{5}$

[illegible] $= \frac{1}{5}$ [illegible]