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MATRIC NUMBER: 19/ENG03/003

MATH 104 ASSIGNMENT

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① $\int 3te^{2t}\,dt$

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

$u = 3t \qquad dv = e^{2t}$

$\frac{du}{dt} = 3 \qquad v = \frac{e^{2t}}{2}$

$du = 3dt$

$\therefore uv - \int v\,du$

$= 3t\left(\frac{e^{2t}}{2}\right) - \int e^{2t}\,3dt$

$= \frac{3te^{2t}}{2} - 3\int e^{2t}\,dt$

$= \frac{3te^{2t}}{2} - \frac{3e^{2t}}{2} + C$

$= \frac{3e^{2t}(t-1)}{2} + C$

② $\int x^2 \sin x\,dx$

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

$\frac{du}{dx} = 2x \qquad v = -\cos x$

$du = 2dx$

$\therefore uv - \int v\,du = -x^2\cos x - \int -\cos x\, 2dx$

$= -x^2\cos x$

$\therefore uv - \int v\,du = -x^2\cos x - \int -\cos x\, 2x\,dx$

$= -x^2\cos x + \int \cos x\, 2x\,dx$

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

$\frac{du}{dx} = 2 \qquad v = \sin x$

$du = 2dx$

$2x\sin x - 2\int \sin x\,dx$

$2x\sin x - 2(-\cos x)$

$2x\sin x + 2\cos x$

$\therefore \int x^2 \sin x\,dx = -x^2\cos x + 2x\sin x + 2\cos x + c$

② $\int x^2 \sin x\,dx$

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$= -x^2\cos x$

$\therefore uv - \int v\,du = -x^2\cos x - \int -\cos x\, 2x\,dx$

$= -x^2\cos x + \int \cos x\, 2x\,dx$

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

$\frac{du}{dx} = 2 \qquad v = \sin x$

$du = 2dx$

$2x\sin x - 2\int \sin x\,dx$

$2x\sin x - 2(-\cos x)$

$2x\sin x + 2\cos x$

$\therefore \int x^2 \sin x\,dx = -x^2\cos x + 2x\sin x + 2\cos x + c$