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MATRIC NUMBER: 19/ENG03/003

MATH 104 ASSIGNMENT

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$$\textcircled{1} \int 3te^{2t} dt$$

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

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

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

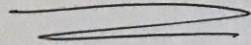
$$du = 3dt$$

$$\therefore uv - \int v du \\ = 3t \left(\frac{e^{2t}}{2} \right) - \int e^{2t} 3dt$$

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

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

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



$$\textcircled{2} \int x^2 \sin x dx$$

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

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

$$du = 2x dx$$

$$\therefore \cancel{uv} - \int v du = x^2 \cos x - \int \cos x 2x dx$$
$$= -x^2 \cos x$$

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

$$\int u = 2x \quad dv = \cos x$$
$$\frac{du}{dx} = 2 \quad v = \sin x$$
$$du = 2 dx$$

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

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

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

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

$$\textcircled{2} \int x^2 \sin x dx$$

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

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

$$du = 2x dx$$

$$\therefore \cancel{uv} - \int v du = x^2 \cos x - \int \cos x 2x dx$$
$$= -x^2 \cos x$$

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

$$\int u = 2x \quad dv = \cos x$$
$$\frac{du}{dx} = 2 \quad v = \sin x$$
$$du = 2 dx$$

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

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

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

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