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MATRIC NO: 19/MHS01/341

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DEPARTMENT MBBS

MAT 104

1. $\int 2x^2 \ln x \, dx$

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

$du = \frac{1}{x} dx \qquad v = \frac{2x^3}{3}$

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

$\int u\,dv = \frac{\ln x \cdot 2x^3}{3} - \int \frac{2x^3}{3} \cdot \frac{1}{x} dx$

$\int u\,dv = \frac{2x^3 \ln x}{3} - \int \frac{2x^2}{3} dx$

$\int u\,dv = \frac{2x^3 \ln x}{3} - \frac{2x^3}{9} + c$

2. $\int 3te^{2t} \, dt$

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

3 4

2. $\int 3te^{2t}\,dt$

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

$du = 3dt \qquad v = \frac{1}{2}e^{2t}$

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

$\int u\,dv = \frac{3t}{2}\cdot\frac{1}{2}e^{2t} - \int \frac{1}{2}e^{2t}\cdot 3dt$

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

$\int u\,dv = \frac{3te^{2t}}{2} - \frac{3}{2}\cdot\frac{1}{2}e^{2t}$

$\int u\,dv = \frac{3te^{2t}}{2} - \frac{3e^{2t}}{4} + C$

3. $\int x^2 \sin x\,dx$

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

$du/dx = 2x \therefore du = 2x\,dx$ $\quad v = -\cos x$

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

$\int u\,dv = x^2 \cdot -\cos x - \int -\cos x \cdot 2x\,dx$

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

$\int u\,dv = -x^2\cos x + 2\left\{\begin{array}{ll} u = x & dv = \cos x \\ du = dx & v = \sin x \end{array}\right.$

$\int u\,dv = -x^2\cos x + 2\{x \cdot \sin x - \int \sin x\,dx\}$

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

$\int u\,dv = -x^2\cos x + 2x\sin x + 2\cos x + c$

4. $\int \cos 5x \cos 6x\,dx$

$A = 5x \quad B = 6x$

$\int uv = -x\cos x + 2x\sin x + 2\cos x + C$

4. $\int \cos 5x \cos 6x \, dx$

$A = 5x \quad B = 6x$

$\cos A \cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$

$\cos A \cos B = \frac{1}{2}[\cos 11x - \cos x]$

$\int \cos 5x \cos 6x \, dx = \frac{1}{2}\int (\cos 11x - \cos x)\, dx$

$\int \cos 5x \cos 6x \, dx = \frac{1}{2}\left[\frac{\sin 11x}{11} - \sin x\right]$

$\int \cos 5x \cos 6x \, dx = \frac{\sin 11x}{22} - \frac{\sin x}{2} + C$

5. $\int \sin 7x \cos 2x \, dx$

$A = 7x \quad B = 2x$

$\sin A \cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$

$\sin A \cos B = \frac{1}{2}[\sin 9x + \sin 5x]$

$\therefore \int \sin 7x \cos 2x \, dx = \frac{1}{2}\int (\sin 9x + \sin 5x)\, dx$

$\int \sin 7x \cos 2x \, dx = \frac{1}{2}\left[\frac{-\cos 9x}{9} - \frac{\cos 5x}{5}\right]$

$\int \sin 7x \cos 2x \, dx = \frac{-\cos 9x}{18} - \frac{\cos 5x}{10} + C$