Mat 104

Name: Ogbeide Eseoke Hope
Matric Number: 19/MHS01/284
Department: MBBS

1) $\int 2x^2 \ln x$

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

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

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

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

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

$\int 2x^2 \ln x = 2x^3 \ln x - 2x^3/9$

$\int 2x^2 \ln x = \frac{2}{3} x^3 (\ln x - \frac{1}{3}) + C$

2) $\int 3t\, e^{2t}$

$u = 3t, \quad du = 3dt$

$dv = e^{2t}, \quad v = e^{2t}/t$

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

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

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

3) $\int x^2 \sin x$

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

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

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

$\int x^2 \sin x = -\cos^3 x - \sin^3 x + C$

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

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

$\cos 5x \cos 6x = \frac{1}{2}[\cos 11x + \cos -x]$

$\int \cos 5x \cos 6x = \frac{1}{2}\int [\cos 11x - \cos x]$

$\int \cos 5x \cos 6x = \frac{1}{2}\left(\frac{\sin 11x}{11} - \sin x\right)$

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

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

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

$\sin 7x \cos 2x = \frac{1}{2}[\sin 9x + \sin 5x]$

$\int \sin 7x \cos 2x = \frac{1}{2}\left(-\cos 9x/9 - \cos 5x/5\right)$

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