Name: Robinu Oluwadamilare Godsfavour
matric no: 19/MHS01/387
Dept: MHS/MBBS
Course code: MAT 102

Integration Assignment

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

$u = \ln x \qquad v = \frac{2x^3}{3}, \; dv = 2x^2$

$du = \frac{1}{x}$

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

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

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

$\frac{2x^3}{3} \ln x - \frac{2x^3}{3 \times 3} + C$

$\frac{2x^3}{3} \ln x - \frac{2x^3}{9} + C$

$\int 2x^2 \ln x\,dx = \frac{2x^3}{3}\left[\ln x - \frac{1}{3}\right] + C$

$$\frac{1}{2}[\sin(7x+2x) + \sin(7x-2x)]$$

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

$$\frac{1}{2}[-\cos 9x/9 - \cos 5x/5] + C$$

$$\left[\frac{\cos 9x}{18} - \frac{\cos 5x}{10}\right] + C$$

$du/dx = 2 \qquad v = \sin x$

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

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

$2x \sin x - \int 2 \sin x\,dx \quad \ldots\ldots (2)$

put (2) into (1)

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

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

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

4 $\int \cos 6x \cos 6x$

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

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

$= \frac{1}{2}[\cos 12x + \cos -x]$

$= \frac{1}{2}[\cos 12x - \cos x]$

$= \frac{1}{2}\left[\frac{\cos 12x}{12} - \frac{\cos x}{1}\right]$

$= \frac{\cos 12x}{24} - \frac{\cos x}{2} + C$

5 $\sin 7x \cos 2x$

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

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

2 $\int 3te^{2t}\,dx$

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

$du/dx = 3$ $\quad v = \frac{1}{2}e^{2t}$

$du = 3dx$

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

$3t \cdot \frac{1}{2}e^{2t} - \int \frac{1}{2}e^{2t} \cdot 3\,dx$

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

$\frac{3}{2}te^{2t} - \frac{1}{2} \cdot \frac{3}{2}e^{2t} + C$

$\left[\frac{3}{2}te^{2t} - \frac{3e^{2t}}{4}\right] + C$

$\int 3te^{2t}\,dt = \left[\frac{3}{2}te^{2t} - \frac{3e^{2t}}{4}\right] + C$

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

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

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

$du = x\,dx$

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

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

$= -x^2 \cos x + \int 2x \cos x\,dx$ ..... (1)

Integrate $\int 2x \cos x\,dx$

Let $u = 2x$ $\quad du = \cos x$ $\quad du = 2dx$