Chukwuemerie Excellence
Chemical Engineering
19/ENG01/005

1. $\int x^{1/2} \ln x$

Integrate by parts

$\int x^{1/2} \rightarrow \int \frac{2\sqrt{x}}{3} dx$

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

Solve $\int 2x^{1/2}/3 \, dx$

$= \frac{-4x^{3/2}}{9}$

$\therefore \int x^{1/2} \ln x \rightarrow \frac{2x^{3/2} \ln x}{3} - \frac{4x^{3/2}}{9} + c$

$\rightarrow \frac{2x^{3/2}(3 \ln x - 2)}{9}$

2. $2 \cos 6t \cos t$

$2 \int \cos t \cos 6t$

Apply product to sum formula

$\frac{1}{2} \int \cos 7t \, dt + \frac{1}{2} \int \cos 5t$

$\frac{1}{7} \int \cos u \, du + \frac{1}{5} \cos a \, da$

$\times \frac{\sin 7t}{7} + \frac{\sin 5t}{5} \quad \times 1/2$

$\frac{1}{2} \int = \frac{\sin 7t}{14} + \frac{\sin 5t}{10} \quad \times 2$

$= \frac{\sin 7t}{7} + \frac{\sin 5t}{5} + c$

3. $\sin^3 x \cos^4 x$

$\int \cos^4 x \sin^3 x$

$\int -\cos^4(x)(\cos^2(x)-1) \cdot \sin(x)\, dx$

$= \int u^4(u^2-1)\, du$

$= \int u^6\, du - \int u^4\, du$

$= \frac{u^7}{7} - \frac{u^5}{5}$

Substitute $\cos x$ for u

$= \frac{\cos^7 x}{7} - \frac{\cos^5 x}{5} + C$