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Matric No: 19/ENC008/059

1i) $\int x^{1/2} \ln x \, dx$

3) $\int \ln(x) \cdot x^{1/2} \, dx$

Use partial integration formular

$\int u \, dv = uv - \int v \, du$ where $u = \ln(x)$

$dv = x^{1/2}$

4) $= \ln x \cdot \frac{2x\sqrt{x}}{3} - \frac{2}{3} \times \frac{2x\sqrt{x}}{3}$

$\frac{2x\sqrt{x} \times \ln x}{3} - \frac{4x\sqrt{x}}{9}$

4) $= \frac{2x\sqrt{x} \times \ln x}{3} - \frac{4x\sqrt{x}}{9} + C$

1i) $\int 2 \cos 6t \cos 6t \, dt$

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

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

$= \frac{1}{2} [\cos(6t+6t) + \cos(6t-6t)]$

$= \frac{1}{2} \cos 7t + \cos 5t$

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

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

2.

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

$u = \cos x$

$\frac{du}{dx} = -\sin x \Rightarrow dx = \frac{-du}{\sin x}$

$= \int \sin^2 x \cdot u^4 \cdot \frac{-du}{\sin x}$

$= \int \left[\frac{u^7}{7} - \frac{u^5}{5} \right] + C$

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