1, $x^{1/2}\ln x$
2, $2\cos 6t \cos t$
3) $\sin^3 x \cos^4 x$

Solution

1, $x^{1/2} \ln x$

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

$u = x^{1/2} \quad dv = \ln x$

$\frac{du}{dx} = 1/2 x^{-1/2}$

$\int v\frac{du}{dx} + \int u\frac{dv}{dx}$

$\ln x \int \frac{x^{1/2}}{dx} + x^{1/2}\int \frac{d\ln x}{dx}$

$\ln x \left[\frac{x^{3/2}}{3/2}\right] + x^{1/2}\left[\int \frac{1}{x}\right] + C$

$\frac{2\ln x}{3} \cdot x^{3/2} + \frac{x^{1/2}}{x} + C$

$\frac{2x^{3/2}\ln x}{3} + \frac{\sqrt{x}}{x} + C$

(2) $\int 2\int \cos 6t \cos t \, dt = 12 \int \cos 6t \cos t \, dt$

$A = 6t \quad B = 1t$

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

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

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

~~$= \frac{1}{2}[$~~

$\int 2\cos 6t \cos t \, dt = \frac{1}{2}\int (2\cos 7t + \cos 5t)$

$= \frac{2}{2}\left[\frac{\sin 7t}{7} - \frac{\sin 5t}{5}\right]$

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

(3) $\int \sin^3 x \cos^4 x = \int \sin^m x \cos^n x$

Since m is odd

$u = (\cos^2 x)^2$

$du/dx = -\sin x \Rightarrow dx = -du/\sin$

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

$\int \sin^3 x ((\cos^2 x)^2 \, dx$

$u = (\cos^2 x)^2$

du/dx

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