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19/MHS01/396

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

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

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

$uv - \int v\,du$

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

$-x^2\cos x + \frac{\cancel{2}x^2}{\cancel{2}}\sin x$

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

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

(4) $\cos 5x \cos 6x = \frac{1}{2}\left[\cos(5+6) + \cos(5-6)\right]$

$= \frac{1}{2}\left[\cos 11x - \cos x\right]$

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

$= \frac{1}{2}\left[\frac{\sin 11x}{11} - \sin x\right] + C$

No4 Ans $= \frac{\sin 11x}{22} - \frac{\sin x}{2} + C$ $\cancel{= \frac{\cos 11x}{22} - \frac{\cos x}{2} + C}$

(5) $\sin 7x \cos 2x$

$= \frac{1}{2}\left[\sin(7+2) + \sin(7-2)\right]$

$= \frac{1}{2}\int \sin 9x + \int \sin 5x$

$\int \sin 7x \cos 2x = \frac{1}{2}\left[\frac{-\cos 9x}{9} - \frac{\cos 5x}{5}\right]$

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

$= \frac{-\cos 9x}{18} - \frac{\cos 5x}{10} + C$

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① $\int 2x^2 \ln x$

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

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

$uv - \int v\,du$

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

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

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

② $\int 3t\, e^{2t}$

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

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

$uv - \int v\,du$

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

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

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