PAVOU WENG CHRISTOPHER
19/MHS01/135

① = $2x^2 \ln x$.
② = $3te^2t$
3 = $x^2 \sin x$
4 = $\cos x \cos 6x$
5 = $\sin 7x \cos 2x$

Solution

① $2x^2 \ln x$

$\int 2x^2 \times \ln(x)\, dx$

$= 2 \times \int \ln(x) \times x^2\, dx$

$= 2\left(\ln(x) \times \frac{x^3}{3} - \int \frac{x^3}{3} \times \frac{1}{x}\, dx\right.$

$= 2\left(\ln(x) \times \frac{x^3}{3} - \int \frac{x^2}{3}\, dx\right.$

$= 2\left(\ln(x) \times \frac{x^3}{3} - \frac{1}{3} \times \int x^2\, dx\right.$

$= 2\left(\ln(x) \times \frac{x^3}{3} - \frac{1}{3} \times \frac{x^3}{3}\right)$

$= \frac{2x^3 \times \ln(x)}{3} - \frac{2x^3}{9}$

$= \frac{2x^3 \times \ln(x)}{3} - \frac{2x^3}{9} + C.$

$\therefore \int 2x^2 \times \ln(x)\,dx = \frac{2x^3}{3} \times \ln(x) - \frac{2x^3}{9} + C.$

2 $3te^{2t}$

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

$3te^{2t} x.$

$3te^{2t} x + C.$

3 $x^2 \sin x$

$\int x^2 \sin x\,dx.$

$x^2 \times (-\cos(x)) - \int -\cos(x) \times 2x\,dx.$

$x^2 \times (-\cos(x)) - 1 \times (-2) \times \int \cos(x) \times x\,dx$

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

$x^2 \times (-\cos x)) + 2 \left(x \times \sin(x) - \int \sin(x)\,dx. \right.$

$x^2 \times (-\cos(x))) + 2 \left(x \times \sin(x) - (-\cos(x)) \right).$

$-x^2 \times \cos(x) + 2x \times \sin(x) + 2\cos(x) + C.$

4 $\cos x \cos 6x$

$\int \cos 5x \cos 6x \, dx$

$\int \frac{1}{2} \times (\cos(-x) + \cos(11x)) \, dx$

$\int \frac{1}{2} \times (\cos(x) + \cos(11x)) \, dx$

$\frac{1}{2} \times \int \cos(x) + \cos(11x) \, dx$

$\frac{1}{2} \times \int \cos x \, dx + \int \cos 11x \, dx$

$\frac{1}{2} \times \left(\sin x + \frac{\sin 11x}{11}\right)$

$\frac{\sin x}{2} + \frac{\sin(11x)}{22}$

$\frac{\sin x}{2} + \frac{\sin 11x + C}{22}$

$\therefore \int \cos 5x \cos 6x \, dx = \frac{\sin x}{2} + \frac{\sin 11x + C}{22}$

5 $\sin 7x \cos 2x$.

$\int \sin 7x \cos 2x \, dx$.

$\int \frac{1}{2} \times \sin 9x + \sin 5x \, dx$.

$\frac{1}{2} \times \int \sin 9x + \sin 5x \, dx$

$\frac{1}{2} \times \int \sin 9x \, dx + \int \sin 5x \, dx$.

$\frac{1}{2} \times \left(\frac{-\cos 9x}{9} - \frac{\cos 5x}{5} \right)$

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

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

$\int \sin 7x \cos 2x \, dx = \frac{\cos 9x}{18} - \frac{\cos 5x}{10} + C$.