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19/ENG05/1088

1 $\int \sin 7x \cos 2x$

Let $u = \cos 2x$, $dv = \sin 7x$

$du = -2\sin 2x\, dx$, $v = -\frac{\cos 7x}{7}$

$uv - \int v\, du$

$-\frac{\cos 2x \cos 7x}{7} - \int \frac{2\cos 7x \sin 2x}{7}\, dx$

$-\frac{\cos 2x \cos 7x}{7} - \frac{2}{7}\int \cos 7x \sin 2x\, dx$

Let $u = \sin 2x$, $dv = \cos 7x$

$du = 2\cos 2x$, $v = \frac{\sin 7x}{7}$

$uv - \int v\, du$

$-\frac{\cos 2x \cos 7x}{7} - \frac{2}{7}\left(\frac{\sin 2x \sin 7x}{7} - \int \frac{2 \sin 7x \cos}{7}\right.$

$-\frac{\cos 2x \cos 7x}{7} - \frac{2}{7}\left(\frac{\sin 2x \sin 7x}{7} - \frac{2}{7}\int \sin 7x \cos 2x\, dx\right.$

$= \int \sin 7x \cos 2x\, dx = -\frac{\cos 2x \cos 7x}{7} - \frac{2}{7}\left(\frac{\sin 2x \sin}{7}\right.$

$-\frac{2}{7}\int \sin 7x \cos 2x\, dx$

$= -\frac{49\cos 2x \cos 7x - 14 \sin 4x \sin 7x}{315} + C$

2 $\int \cos 3x \cos x \, dx$

$u = \cos x \qquad dv = \cos 3x$

$du = -\sin x \, dx \qquad v = \frac{\sin 3x}{3}$

$uv - \int v \, du$

$\frac{\cos x \sin 3x}{3} - \int -\frac{\sin 3x \sin x}{3} \, dx$

$\frac{\cos x \sin 3x}{3} + \frac{1}{3} \int \sin 3x \sin x \, dx$

Let $u = \sin x \qquad dv = \sin 3x$

$du = \cos x \, dx, \quad v = -\frac{\cos 3x}{3}$

$uv - \int v \, du$

$\frac{\cos x \sin 3x}{3} + \frac{1}{3}\left(-\frac{\sin x \cos 3x}{3} - \int -\frac{\cos 3x \cos x \, dx}{3}\right)$

$\frac{\cos x \sin 3x}{3} + \frac{1}{3}\left(-\frac{\sin x \cos 3x}{3} + \frac{1}{3}\int \cos 3x \cos x \, dx\right)$

$\int \cos 3x \cos x \, dx = \frac{\cos x \sin 3x}{3} + \frac{1}{3}\left(-\frac{\sin x \cos 3x}{3}\right.$

$\left. + \frac{1}{3}\int \cos 3x \cos x \, dx\right)$

$= \frac{3\cos x \sin 3x - \sin x \cos 3x}{8} + C$