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MATRIc NO:19/MHS01/122

Mbbs maths104

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Course Maths 104

2)

1) $\int \sin^6 x \, dx$

$= \int \sin^4 x \sin^2 x$

$\sin^2 x = \frac{1 - \cos 2x}{2} \quad \sin^4 x = \left(\frac{1 - \cos 2x}{2}\right)^2$

$\int \sin^6 x \, dx = \int \left(\frac{1 - \cos 2x}{2}\right)\left(\frac{1 - \cos 2x}{2}\right)^2$

Note $\int \left(\frac{1 - \cos 2x}{2}\right) = \frac{1}{2}\int 1 - \cos 2x$

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

$\int \sin^4 x = \int \left(\frac{1 - \cos 2x}{2}\right)^2$

$\int \sin^4 x = \int \left(\frac{1 - \cos^2 4x}{4}\right)$

$= \frac{1}{4}\int (1 - \cos^2 4x)$

Note $\cos^2 2x = 1 + \cos 4x/2$ but $\cos^2 4x = 1 + \cos 8x/2$

$= \frac{1}{4}\int 1 - \left[\frac{1 + \cos 8x}{2}\right]$

Note $\int \sin^6 x = \frac{1}{2}\left[x - \frac{\sin 2x}{2}\right] + \frac{1}{4}\int 1 - \frac{1}{4}\int \frac{1 + \cos 8x}{2}$

Note $\int \sin 6x = \frac{1}{2}\left[x - \frac{\sin 2x}{2}\right) + \frac{x}{4} - \frac{1}{8}\int \frac{1 + \cos 8x}{2}$

$\frac{1}{8}[x + \sin 8x/8$

$\int \sin 6x = \frac{1}{2}\left[x - \frac{\sin 2x}{2}\right] + \frac{x}{4} - \frac{1}{8}x - \frac{1}{64}\sin 8x$

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2) $\int \cos^4 x \sin^3 x$

$m =$ odd $\quad u = \cos x$

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

$\int \sin^3 x \cos^4 x = \int \sin x \sin^2 x \cos^4 x$

$\int \sin^3 x \cos^4 x = \int \sin x \sin^2 x \times u^4 \, dx$

$\int \sin^3 x \cos^4 x = \int \sin x \sin^2 x \times u^4 \times \frac{du}{-\sin x}$

$\int \sin^3 x \cos^4 x = \int \sin^2 x \times u^4 \cdot -du$

$\sin^2 x = 1 - \cos^2 x$

$\int \sin^3 x \cos^4 x = \int (1 - u^2) u^4 \times -du$

$= \int (u^4 - u^6) \times -du$

$\int \sin^3 x \cos^4 x = \int u^6 - u^4 \, du$

$\int \sin^3 x \cos^4 x = \left[\frac{u^{6+1}}{7} - \frac{u^5}{5} \right] = \frac{u^7}{7} - \frac{u^5}{5}$

$\int \sin^3 x \cos^4 x = \frac{\cos^7 x}{7} - \frac{\cos^5 x}{5} + c$

3) $\int \cos x \sin 3x$

~~$u = \cos x$ because $\sin^m x$ = odd~~

$\int \cos x \sin 3x$

$\int \cos x \times \int \sin 3x = ?$

$\left[\frac{\sin x}{1} \right] \times \left[\frac{-\cos 3x}{3} \right] + c$

$\int \cos x \sin 3x = \sin x \times \frac{-\cos 3x}{3} + c$

$\int \cos x \sin 3x = \frac{-\cos 3x}{3} \sin x + c$

$\int \cos A \sin B = \int \cos x \sin 3x$

$\int \cos A \sin B = \int \frac{1}{2} (\sin(A+B) - \sin(A-$

$\int \cos x \sin 3x = \int \frac{1}{2} (\sin 4x) - \sin(-2$

$= \frac{1}{2} \int \sin 4x + \sin 2x$

$\frac{1}{2} \left[\frac{-\cos 4x}{4} - \frac{\cos 2x}{2} \right] + c$

$\int \cos x \sin 3x = \frac{-1}{8} \cos 4x - \frac{\cos 2x}{4} + c$

$$\int \frac{}{2}\Big(\quad \Big)$$

$$= \frac{1}{2}\int \Big(\sin 7x\Big) - \sin\Big(-5x\Big)$$

$$= \frac{1}{2}\left[-\frac{\cos 7x}{7} - \frac{\cos 5x}{5}\right] + c$$

$\int \cos x \sin 2x$

3) $\int \cos x \sin^3 x$

$u = \cos x$

$du/dx = -\sin x$

$\int \cos x \sin^3 x = \int \cos x \times \sin^2 x \times \sin x \, dx$

$\int \cos x \sin^3 x = \int \cos x \times (1 - \cos^2 x) \times \sin x \times \dfrac{du}{-\sin x}$

$\int \cos x \sin^3 x = \int -u \times (1 - u^2) \times du$

$\int \cos x \sin^3 x = + \int (u^3 - u)\, du$

$\int \cos x \sin^3 x = \left[\dfrac{u^4}{4} - \dfrac{u^2}{2}\right] + c$

$\int \cos x \sin^3 x = \dfrac{\cos^4 x}{4} - \dfrac{\cos^2 x}{2} + c$