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MATRIC NO: 19/MHS01/400

COURSE: GENERAL MATHEMATICS II.

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

Using reduction formula: $\int \sin^n x \, dx = -\frac{\sin^{n-1} x \cos x}{n} + \frac{n-1}{n} \int \sin^{n-2} x \, dx$

$$\int \sin^6 x \, dx = -\frac{\sin^5 x \cos x}{6} + \frac{5}{6} \int \sin^4 x \, dx$$

$$= -\frac{\sin^5 x \cos x}{6} + \frac{5}{6}\left[\frac{\sin^3 x \cos x}{4} + \frac{3}{4} \int \sin^2 x \, dx\right]$$

$$= \frac{-1}{6} \sin^5 x \cos x - \frac{5}{24} \sin^3 x \cos x + \frac{5}{8} \int \sin^2 x \, dx.$$

$$= \frac{-1}{6} \sin^5 x \cos x - \frac{5}{24} \sin^3 x \cos x + \frac{5}{8}\left[\frac{-\sin x \cos x}{2}\right] + \frac{1}{2} \int \sin x \, dx.$$

$$\int \sin^6 x \, dx = \frac{-1}{6} \sin^5 x \cos x - \frac{5}{24} \sin^3 \cos x - \frac{5}{16} \sin x \cos x + \frac{5}{16} x + c.$$

2. $\cos^4 x \sin^3 x \, dx$.

Let $u = \cos x$; $\frac{du}{dx} = -\sin x$; $dx = \frac{-du}{\sin x}$.

$\int (u^4 \cdot \sin x \cdot \sin^2 x) \frac{-du}{\sin x}$

$\int (-u^4 (1 - \cos^2 x)) \, du$

$\int -u^4 (1 - u^2) \, du$

$\int (-u^4 + u^6) \, du$

$\int u^6 - u^4) \, du$.

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

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

3. $\cos x \sin^3 x \, dx$.

Let $u = \sin x$; $\frac{du}{dx} = \cos x$; $du = \cos x \, dx$.

$\int \sin^3 x \cos x \, dx$

$\int u^3 \cdot du$

$\frac{u^4}{4} + c$.

$\cos x \sin^3 x \, dx = \frac{\sin^4 x}{4} + c$.