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19/MH301/002

Medicine and Health Sciences

Medicine and Surgery

MAT 104 Assignment

Title: MARS Assignment.

$$\begin{aligned} 1) \int \sin^6 x \, dx &= \frac{-1}{6} \times \sin(x)^5 \cos(x) + \frac{5}{6} \int \sin(x)^4 \, dx \\ &= \frac{-1}{6} \sin(x)^5 \cos(x) + \frac{5}{6} \times \left( \frac{-1}{4} \sin(x)^3 \cos(x) + \frac{3}{4} \int \sin(x)^2 \, dx \right) \\ &= \frac{-1}{6} \times \sin(x)^5 \cos(x) + \frac{5}{6} \left( \frac{-1}{4} \sin^3 x \cos x + \frac{3}{4} \int \frac{1 - \cos 2x}{2} \, dx \right) \\ &= \frac{-1}{6} \times \sin(x)^5 \cos(x) + \frac{5}{6} \left( \frac{-1}{4} \sin^3 x \cos x + \frac{3}{4} \int \frac{1 - \cos 2x}{2} \, dx \right) \\ &= \frac{-1}{6} \sin^5 x \cos x + \frac{5}{6} \left( \frac{-1}{4} \sin^3 x \cos x + \frac{3}{4} \times \frac{1}{2} \int (1 - \cos 2x) \, dx \right) \\ &= \frac{-1}{6} \sin^5 x \cos x + \frac{5}{6} \times \left( \frac{-1}{4} \sin^3 x \cos x + \frac{3}{8} \left( \int 1 \, dx - \int \cos 2x \, dx \right) \right) \\ &= \frac{-1}{6} \sin^5 x \cos x + \frac{5}{6} \left( \frac{-1}{4} \sin^3 x \cos x + \frac{3}{8} \left( x - \frac{\sin 2x}{2} \right) \right) \\ &= \frac{\sin^5 x \cos x}{6} - \frac{5 \sin^3 x \cos x}{24} - \frac{5}{16} x + \frac{3 \sin 2x}{32} + C \end{aligned}$$

$$\begin{aligned} 2) \int \cos^4 x \sin^3 x \, dx \\ \text{Let } u = \cos x \\ = \int -u^4 + u^6 \, du \\ = -\int u^4 \, du + \int u^6 \, du \\ = -\frac{u^5}{5} + \frac{u^7}{7} \\ = -\frac{\cos(x)^5}{5} + \frac{\cos(x)^7}{7} \\ = -\frac{\cos(x)^5}{5} + \frac{\cos(x)^7}{7} + C \end{aligned}$$

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

$$\text{let } u = \sin x$$

$$= \int u^3 \, dx$$

$$= \frac{u^4}{4}$$

$$= \frac{\sin^4 x}{4}$$

$$= \frac{\sin(x)^4}{4} + C$$