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

substitute $u = \sin(x)$

$= \int u^3 dx$

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

substitute back

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

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

2. $\int \cos^4 x \sin^3 x \, dx$ Let $u = \cos(x$

$= \int -u^4 + u^6 \, du$

$= -\int u^4 \, du + \int u^6 \, du$

$= -\frac{u^5}{5} + \frac{u^7}{7}$

$= \frac{-\cos(x)^5}{5} + \frac{\cos(x)^7}{7}$ substitute ba

$= \frac{-\cos(x)^5}{5} + \frac{\cos(x)^7}{7} + C$ //

Department: M.B.B.S

Assignment

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

$= -\frac{1}{6} \times \sin(x)^5 \cos(x) + \frac{5}{6}\int \sin(x)^4 dx$

$= -\frac{1}{6} \sin(x)^5 \cos(x) + \frac{5}{6} \times \left(-\frac{1}{4} \sin(x)^3 \cos(x) + \frac{3}{4}\int \sin(x)^2 dx\right)$

$= -\frac{1}{6} \times \sin(x)^5 \cos(x) + \frac{5}{6}\left(-\frac{1}{4} \sin x^3 \cos x + \frac{3}{4}\int \frac{1-\cos 2x}{2} dx\right)$

$= -\frac{1}{6} \sin(x)^5 \cos(x) + \frac{5}{6}\left(-\frac{1}{4} \sin x^3 \cos x + \frac{3}{4}\int \frac{1-\cos 2x}{2} dx\right)$

$-\frac{1}{6} \sin x^5 \cos x + \frac{5}{6}\left(-\frac{1}{4} \sin x^3 \cos x + \frac{3}{4} \times \frac{1}{2}\int 1 - \cos 2x\, dx\right)$

$-\frac{1}{6} \sin x^5 \cos x + \frac{5}{6} \times \left(-\frac{1}{4} \sin x^3 \cos x + \frac{3}{8}\left(\int 1 dx - \int \cos 2x\, dx\right)\right)$

$-\frac{1}{6} \sin x^5 \cos x + \frac{5}{6}\left(-\frac{1}{4} \sin x^3 \cos x + \frac{3}{8}\left(x - \frac{\sin 2x}{2}\right)\right)$

$= \frac{\sin x^5 \cos x}{6} - \frac{5 \sin x^3 \cos x}{24} - \frac{5}{16} \times \frac{5 \sin 2x}{32} + c$