Name: | [illegible]
Department: | [illegible]
Matric no: | 17/[illegible]/155
Course code: | MTH 104

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

Solution:

let $u = \sin x$

$du/dx = \cos x, \quad dx = du/\cos x$

$\int u^6\, du \cdot \frac{dx}{du} = \int u^6 \cdot \frac{du}{\cos x}$

$= \frac{u^7}{7\cos x} + C$

$\frac{(\sin x)^7 x}{7\cos x} = \frac{\sin^7 x}{7\cos x} + C = \frac{1}{7}\frac{\sin^7 x}{\cos x} + C$

(2) $\cos x\,\sin^3 x \rightarrow \int \cos x \sin^3 x$

both are odd.

$u = \cos x$

$du/dx = -\sin x; \quad dx = -du/\sin x$

$\int u \cdot \sin^3 x \cdot -\frac{du}{\sin x}$

$-\int \sin^3 x \cdot u \cdot \frac{du}{\sin x} = -\int \sin^2 x \cdot u \cdot du$

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

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

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

$-\int (u - u^3)\,du$

$\int (u^3 - u)\,du$

$= \frac{u^4}{4} - \frac{u^2}{2} + C = \frac{\cos^4 x}{4} - \frac{\cos^2 x}{2} + C$

→ $\cos^4 x \sin^3 x \rightarrow \int \cos^4 x \sin^3 x \Rightarrow \int \sin^3 x \cos^4 x$

Sol-t.

m is odd, ~~n is~~

$\therefore u = \cos x$

$dy/dx = -\sin x \Rightarrow dx = -du/\sin x$.

recall: $\sin^2 + \cos^2 x = 1$

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

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

$-\int \sin^2 x \cdot u^4 \, du$.

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

recall $u = \cos x$.

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

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

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

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

$\frac{\cos^7 x}{7} - \frac{\cos^5 x}{5} + C$ //.