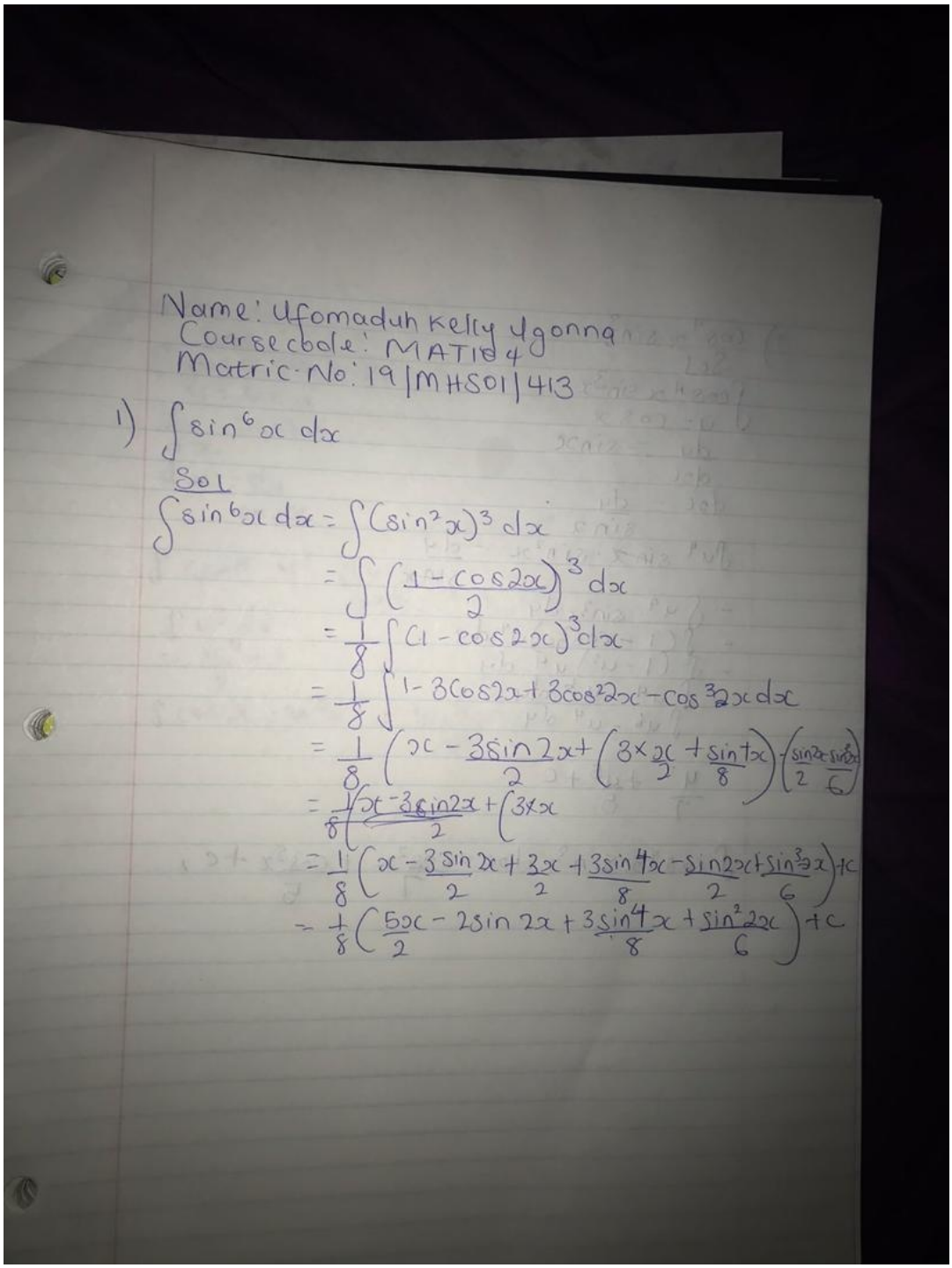
Ufomaduh Kelly Ugonna 19/MHS01/413 MBBS



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Coursecbole: MATI84
Matric No: 19/MHS01/413

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

Sol

$$\int \sin^6 x \, dx = \int (\sin^2 x)^3 \, dx$$

$$= \int \left(\frac{1-\cos 2x}{2}\right)^3 dx$$

$$= \frac{1}{8}\int (1-\cos 2x)^3 dx$$

$$= \frac{1}{8}\int 1 - 3\cos 2x + 3\cos^2 2x - \cos^3 2x \, dx$$

$$= \frac{1}{8}\left(x - \frac{3\sin 2x}{2} + \left(3\times\frac{x}{2} + \frac{\sin 4x}{8}\right) + \left(\frac{\sin 2x \sin^2 x}{2} \quad \frac{}{6}\right)\right.$$

$$= \frac{1}{8}\left(x - \frac{3\sin 2x}{2} + \left(3\times x\right)\right.$$

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

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

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

Sol

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

$u = \cos x$

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

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

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

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

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

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

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

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

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

$\int \cos^4 x \sin^3 x \, dx = \frac{\cos^7 x}{7} + \frac{\cos^5 x}{5} + C,$

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

Sol

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

$u = \sin x$

$\frac{du}{dx} = \cos x$

$dx = \frac{du}{\cos x}$

$\int \cancel{\cos x} \cdot u^3 \frac{du}{\cancel{\cos x}}$

$\int u^3 \, du$

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

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