EMEKA-ONWUNEME SOCHIBUNDUM MICHAEL
19/ENG06/022
MECHANICAL ENGINEERING

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MAT 104 S/N: 37.

1. $\int x^{1/2} \ln x$

$u = \ln x \qquad dv = x^{1/2}$

$\frac{du}{dx} = \frac{1}{x} \qquad v = \frac{x^{3/2}}{3/2}$

$du = \frac{1}{x} \cdot dx \qquad v = \frac{2x^{3/2}}{3}$

$\int u\,dv = uv - \int v\,du$

$= \ln x\left(\frac{2x^{3/2}}{3}\right) - \int \frac{2x^{3/2}}{3} \cdot \frac{1}{x}\,dx$

$\frac{2x^{3/2}}{3}\ln x - \int \frac{2x^{1/2}}{3}\,dx$

$\frac{2x^{3/2}}{3}\ln x - \frac{2x^{3/2}}{3/2 \times 3} + c$

$= \frac{2x^{3/2}}{3}\ln x - \frac{4x^{3/2}}{9} + c$ //

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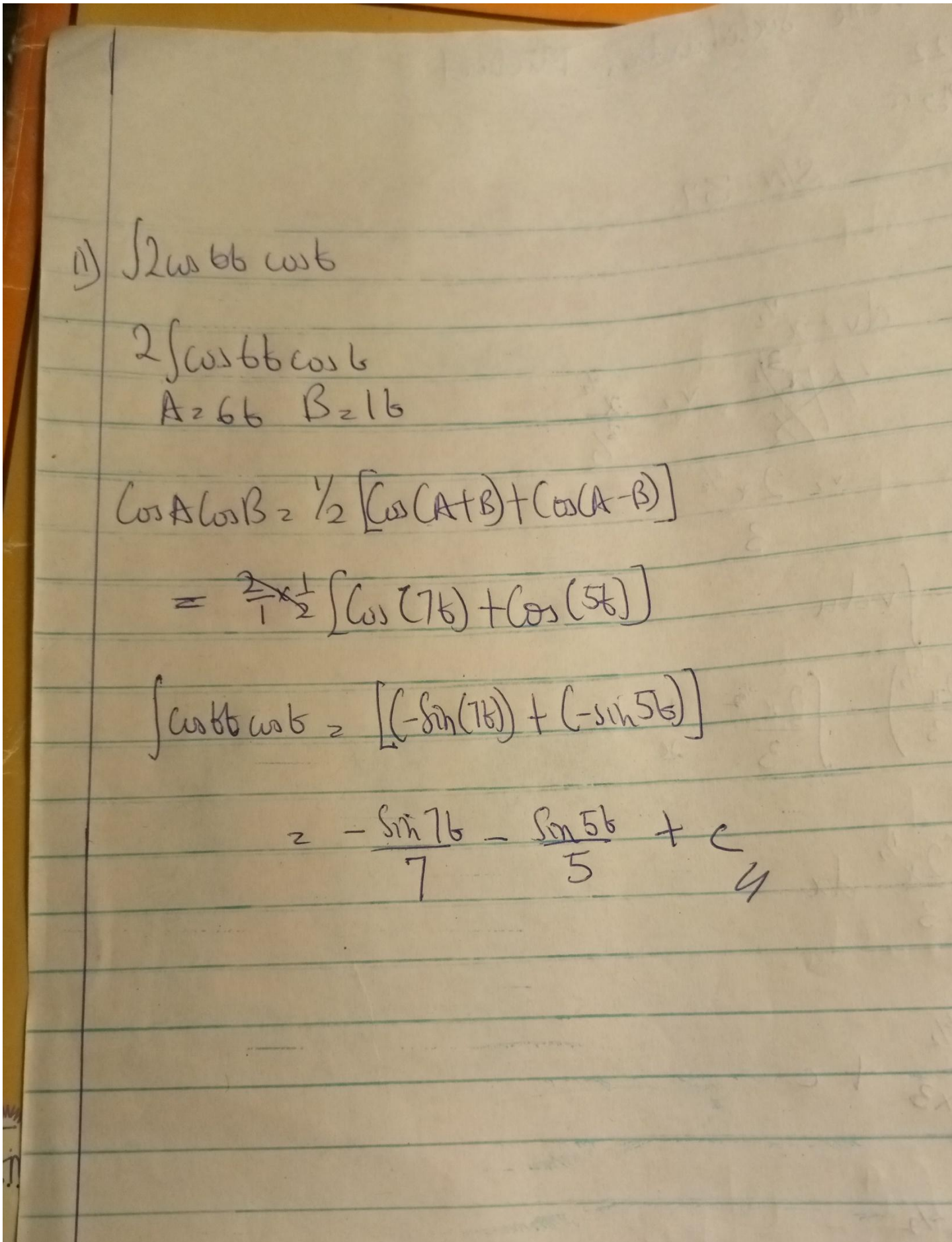

11) $\int 2\cos 6\theta \cos\theta$

$2\int \cos 6\theta \cos\theta$

$A = 6\theta \quad B = 1\theta$

$\cos A \cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$

$= \frac{2}{1} \times \frac{1}{2}[\cos(7\theta) + \cos(5\theta)]$

$\int \cos 6\theta \cos\theta = [(-\sin(7\theta)) + (-\sin 5\theta)]$

$= -\frac{\sin 7\theta}{7} - \frac{\sin 5\theta}{5} + c$

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

Since m is odd

$u = \cos x$

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

And

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

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

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

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

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

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

$$\int (u^8 - u^4) \, du = \left[\frac{u^9}{9} - \frac{u^5}{5}\right] + c$$

$$= \frac{(\cos x)^9}{9} - \frac{(\cos x)^5}{5} + c$$