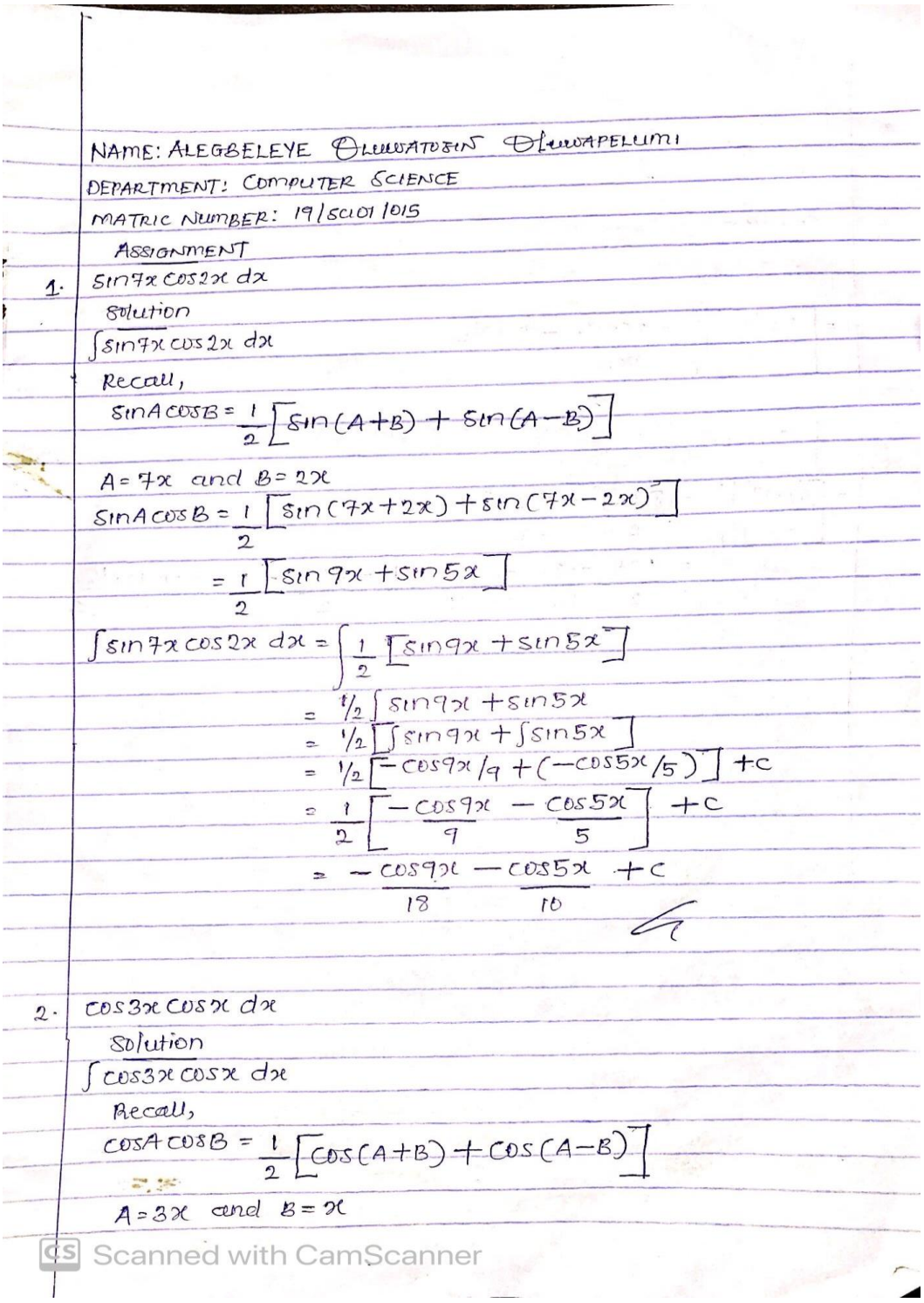
NAME: ALEGBELEYE OLUWATOSIN OLUWAPELUMI

DEPARTMENT: COMPUTER SCIENCE

MATRIC NO: 19/SCI01/015

ASSIGNMENT



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1. $\sin 7x \cos 2x \, dx$

Solution

$\int \sin 7x \cos 2x \, dx$

Recall,

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

$A = 7x$ and $B = 2x$

$\sin A \cos B = \frac{1}{2}[\sin(7x+2x) + \sin(7x-2x)]$

$= \frac{1}{2}[\sin 9x + \sin 5x]$

$\int \sin 7x \cos 2x \, dx = \int \frac{1}{2}[\sin 9x + \sin 5x]$

$= \frac{1}{2}\int \sin 9x + \sin 5x$

$= \frac{1}{2}[\int \sin 9x + \int \sin 5x]$

$= \frac{1}{2}[-\cos 9x/9 + (-\cos 5x/5)] + c$

$= \frac{1}{2}\left[\frac{-\cos 9x}{9} - \frac{\cos 5x}{5}\right] + c$

$= -\frac{\cos 9x}{18} - \frac{\cos 5x}{10} + c$

2. $\cos 3x \cos x \, dx$

Solution

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

Recall,

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

$A = 3x$ and $B = x$

$\cos A \cos B = \frac{1}{2}[\cos(3x+x) + \cos(3x-x)]$

$= \frac{1}{2}[\cos 4x + \cos 2x]$

$\int \cos 3x \cos x \, dx = \int \frac{1}{2}[\cos 4x + \cos 2x]$

$= 1/2 \int \cos 4x + \cos 2x$

$= 1/2 [\int \cos 4x + \int \cos 2x]$

$= \frac{1}{2}\left[\frac{\sin 4x}{4} + \frac{\sin 2x}{2}\right] + c$

$= \frac{\sin 4x}{8} + \frac{\sin 2x}{4} + c$

(3.) $\frac{\cos x \, dx}{\sin^2 x}$

solution

$\int \frac{\cos x}{\sin^2 x} dx$

Let $u = \sin x$

$\frac{du}{dx} = \cos x$ ×

$du = \cos x \, dx$

$dx = \frac{1}{\cos x} du$

we have,

$\int \frac{\cos x}{\sin^2 x} dx = \int \frac{\cos x}{\sin^2 x} \times \frac{1}{\cos x} du = \int \frac{1}{\sin^2 x} du$

recall, $u = \sin x$

$= \int \frac{1}{u^2} du = \int u^{-2} du$

$= \left[\frac{u^{-2+1}}{-2+1}\right] = \frac{u^{-1}}{-1} = -u^{-1}$

$= -\frac{1}{u} = \frac{-1}{\sin x}$

4. $\int_1^2 \left(\int_0^3 9x^2 y \, dx \right) dy$

Solution

$\int_0^3 9x^2 y \, dx$

$= \left[3x^3 y \right]_0^3 = 3(3)^3 y - 3(0)^3 y$

$= 81y$

$= \int_1^2 81y \, dy$

$= \left[\frac{81y^2}{2} \right]_1^2 = \frac{81(2)^2}{2} - \frac{81(1)^2}{2}$

$= \frac{324}{2} - \frac{81}{2} = \frac{324 - 81}{2} = \frac{243}{2} = 121.5$ or $121\frac{1}{2}$