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DEPARTMENT: COMPUTER SCIENCE

MATRIC NO: 19/SCI01/057

ASSIGNMENT

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Assignment  
VER: Comp Science  
Matric no: 19/SCI01/057

1)  $\int \sin 7x \cos 2x \, dx$   
Recall  
 $\sin A \cos B = \frac{1}{2} [\sin(A+B) + \sin(A-B)]$   
 $A = 7x$  and  $B = 2x$   
 $\sin A \cos B = \frac{1}{2} [\sin(7x+2x) + \sin(7x-2x)]$   
 $= \frac{1}{2} [\sin 9x + \sin 5x]$   
 $\int \sin 7x \cos 2x \, dx = \int \frac{1}{2} [\sin 9x + \sin 5x] \, dx$   
 $= \frac{1}{2} \int \sin 9x + \sin 5x$   
 $= \frac{1}{2} \left[ \int \sin 9x + \int \sin 5x \right]$   
 $= \frac{1}{2} \left[ -\cos 9x/9 + (-\cos 5x/5) \right] + C$   
 $= \frac{1}{2} \left[ -\frac{\cos 9x}{9} - \frac{\cos 5x}{5} \right] + C$   
 $= -\frac{\cos 9x}{18} - \frac{\cos 5x}{10} + C$

2)  $\int \cos 3x \cos 2x \, dx$   
Soln  
 $\int \cos 3x \cos 2x \, dx$   
Recall,  
 $\cos A \cos B = \frac{1}{2} [\cos(A+B) + \cos(A-B)]$   
 $A = 3x$  and  $B = 2x$   
 $\cos A \cos B = \frac{1}{2} [\cos(3x+2x) + \cos(3x-2x)]$   
 $= \frac{1}{2} [\cos 5x + \cos x]$   
 $\int \cos 3x \cos 2x \, dx = \int \frac{1}{2} [\cos 5x + \cos x] \, dx$   
 $= \frac{1}{2} \int \cos 5x + \cos x$   
 $= \frac{1}{2} \left[ \int \cos 5x + \int \cos x \right]$   
 $= \frac{1}{2} \left[ \frac{\sin 5x}{5} + \frac{\sin x}{1} \right] + C$   
 $= \frac{\sin 5x}{10} + \frac{\sin x}{2} + C$

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

Soln  

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

$$\text{let } u = \sin x$$

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

$$du = \cos x dx$$

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

we have,

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

$$\text{recall, } u = \sin x$$

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

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

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

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

$$\text{Soln}$$

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

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

$$= 81y$$

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

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

$$= \frac{324}{2} - \frac{81}{2} = \frac{324-81}{2} = \frac{243}{2}$$

$$= 121.5 \text{ or } 121 \frac{1}{2}$$