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Matric: 19/SCI09/003

Assignment: maths 104

Level: 100lvl

$$\begin{aligned} 1. \int \sin 7x \cos 2x \\ A=7x, B=2x \\ \sin A \cos B &= \frac{1}{2} [\sin(A+B) + \sin(A-B)] \\ &= \frac{1}{2} [\sin(7x+2x) + \sin(7x-2x)] \\ &= \frac{1}{2} [\sin 9x + \sin 5x] \\ &= \frac{1}{2} \left[ \frac{-\cos 9x}{9} - \frac{\cos 5x}{5} \right] \end{aligned}$$

$$\int \sin 7x \cos 2x = \frac{-\cos 9x}{18} - \frac{\cos 5x}{10} + C$$

$$\begin{aligned} 2. \int \cos 3x \cos x \, dx \\ A=3x, B=x \\ \cos A \cos B &= \frac{1}{2} [\cos(A+B) + \cos(A-B)] \\ &= \frac{1}{2} [\cos(3x+x) + \cos(3x-x)] \\ &= \frac{1}{2} [\cos 4x + \cos 2x] \\ &= \frac{1}{2} \left[ \frac{\sin 4x}{4} + \frac{\sin 2x}{2} \right] \end{aligned}$$

$$\int \cos 3x \cos x \, dx = \frac{\sin 4x}{8} + \frac{\sin 2x}{4} + C$$

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

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

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

~~cos x~~ ~~dx~~ ~~sin x~~

$$= \int \frac{\cos x}{u^2} \cdot \frac{du}{\cos x}$$

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

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

$$= \frac{u^{-1}}{-1} = -\frac{1}{u}$$

$$u = \sin x$$

$$\int \frac{\cos x}{\sin^2 x} dx = -\frac{1}{\sin x} + C$$

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

$$= 162 - 40.5$$

$$= 121.5$$

$$\int_0^3 9x^2y dx = \left[ \frac{9x^3}{3} y \right]_0^3 = 3(3^3)y = 81y$$

$$= \int_1^2 81y dy = \left[ \frac{81y^2}{2} \right]_1^2$$

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