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MATHE 104

DE BYELAMI

AERONAUTICAL ENGINEERING

~~18/CNG09/0000~~ 08/CNG09/004

$$\int \sin a \cos b x dx$$

$$\sin a \cos b = \frac{1}{2} (\sin(a+b) + \sin(a-b))$$

$$\int \sin 4x \cos 2x dx = \frac{1}{2} \int (\sin 6x + \sin 2x) dx$$

$$\frac{1}{2} \left[\int \sin 6x dx + \int \sin 2x dx \right]$$

$$= \frac{1}{2} \left(\frac{-\cos 6x}{6} + \frac{\cos 2x}{2} \right) + C$$

$$\int \cos a \cos b x dx$$

$$\cos a \cos b = \frac{1}{2} (\cos(a+b) + \cos(a-b))$$

$$\int \cos 4x \cos 2x dx \Rightarrow \frac{1}{2} \int (\cos 6x + \cos 2x) dx$$

$$\frac{1}{2} \left[\int \cos 6x dx + \int \cos 2x dx \right]$$

$$= \frac{1}{2} \left(\frac{\sin 6x}{6} + \frac{\sin 2x}{2} \right) + C$$

$$= \frac{\sin 6x}{8} + \frac{\sin 2x}{4} + C$$

$$3. \int \frac{\cos 5x}{\sin^2 x} dx$$

$$u = \sin^2 x$$

$$du = 2 \sin x \cos x dx$$

$$\frac{1}{2} \int \frac{\cos x}{\sin x \cos x} dx$$

$$\frac{1}{2} \int \frac{1}{\sin x} dx$$

$$\frac{1}{2} \ln |\sin x| + c$$

$$4. \int_1^2 \int_0^3 9x^2 y^2 dx dy$$

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

$$\int_1^2 \left[\frac{9x^3 y^2}{3} \right]_0^3 dy$$

$$\int_1^2 [3x^3 y^2] dy$$

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

$$\left[\frac{81y^3}{3} \right]_1^2$$

$$\frac{81 \times 4}{3} - \frac{81 \times 1}{3} = \frac{81(4)}{3} - \frac{81}{3} = 121 \frac{81}{3}$$