(3) $\cos x / \sin^2 x \, dx$

Solution

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

Let $u = \sin x$, the $du = \cos x dx$

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

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

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

$$= -\csc x$$

Find the Integral of the following:

(1) $\sin 7x \cos 2x \, dx$

(2) $\cos 3x \cos x \, dx$

(3) $\cos x / \sin^2 x \, dx$

(4) ~~double~~ double Integral with limits from 1 to 2, from 0 to 3 ~~and from~~ $(9x^2 y) \, dx dy$

Solution

(1) $\sin 7x \cos 2x \, dx$

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

using the trigonometric Product Identity rewrite the Integrand.

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

$\therefore I = \frac{1}{2}\int \sin(7x + 2x) + \sin(7x - 4x) \, dx$

$= \frac{1}{2}\int \sin(9x) + \sin(5x) \, dx$

$= \frac{1}{2}\int \sin(9x) + \frac{1}{2}\int \sin(5x) \, dx$

$= -\frac{1}{2} \cdot \frac{1}{9} \cos(9x) - \frac{1}{2} \cdot \frac{1}{5} \cos(5x) + C$

$= -\frac{1}{18} \cos(9x) - \frac{1}{10} \cos(5x) + C$

$= -\left(\frac{1}{18} \cos(9x) + \frac{1}{10} \cos((5x))\right) + C$