31/08/xx Class-XII^{sc}(MATHS) K.Kanhaiya

Methods of Integration :-

(a) Integration by Substitution.

(b) Integration using partial fraction

(c) Integration by parts.

Now, let us Start by Substitution :-

(1) $\int \sin mx\,dx$ put x

Let $mx = t$

$$\frac{dt}{dx} = m \Rightarrow \frac{dt}{m} = dx$$

$$\int \frac{\sin t}{m}\,dt$$

$$\frac{1}{m}\int \sin t\,dt = \frac{1}{m}(-\cos t) + C$$

$$\Rightarrow \boxed{-\frac{\cos mx}{m} + C}$$

2) $\int 2x \sin(x^2+1)\,dx$

Let $x^2+1 = t$

differentiating w.r.t x

$$\frac{dt}{dx} = 2x$$

$$\frac{dt}{2} = x\,dx$$

$$\int \cancel{2} \sin t \frac{dt}{\cancel{2}} = \int \sin t\,dt$$

$$\Rightarrow -\cos t + c \Rightarrow -\cos(x^2+1) + c.$$

Differentiate / integrate $y = \sin\frac{(\tan^{-1}x)}{1+x^2}$ w.r.t x

$$\int \frac{\sin(\tan^{-1}x)}{1+x^2}\,dx,$$

Let $\tan^{-1}x = t \quad \therefore \frac{dt}{dx} = \frac{1}{1+x^2}$

$$\therefore dt = \frac{dx}{x^2+1}$$

$$\int \sin t\,dt = -\cos t + c$$

$$= -\cos(\tan^{-1}x) + c$$