Name : Anage Ezeli Vanessa
Department : MBBS
Matric Number : 19/MHS01/096

1 $\int \frac{2x}{\sqrt{4x^2-1}}\,dx$

Let $u = \sqrt{4x^2-1} = (4x^2-1)^{1/2}$

$\frac{du}{dx} = \frac{1}{2}(4x^2-1)^{-1/2} \cdot 8x^{1}$

$\frac{du}{dx} = 4x(4x^2-1)^{-1/2}$

$dx = \frac{du}{4x(4x^2-1)^{1/2}} = \frac{(4x^2-1)^{1/2}\,du}{4x}$

We have,

$2\int \frac{x}{4}\,dx = \frac{1}{2}\int \frac{x}{(4x^2-1)^{1/2}} \cdot \frac{(4x^2-1)^{1/2}\,du}{4x}$

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

$= \frac{1}{2}u + C = \frac{1}{2}\sqrt{4x^2-1} + C$

2 $\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx$

$= \int \sin^{-1}x \cdot (1-x)^{-1/2}\,dx$

Let $u = \sin^{-1}x$

$du = (1-x^2)^{-1/2}\,dx$

$$\int u\,du = \frac{u^2}{2} + C$$

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

3 $\int (\tan x)^6 \sec^2 x\,dx$

let $u = \tan x$

$du = \sec^2 x\,dx$

therefore,

$$\int u\,du = \frac{u^7}{7}$$

$$= \frac{(\tan x)^7}{7} + C$$