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MATRIC NO: 19/MHS01/121

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

let $u = 4x^2 - 1$

$u^2 = 4x^2 - 1$

$2u\,du = 8x\,dx$

$dx = \frac{2u\,du}{8x}$

$\therefore \int \frac{2x}{u} \times \frac{2u\,du}{8x} = \frac{1}{4}\int \frac{2u\,du}{u} = \frac{1}{4}\int 2\,du$

$\int \frac{2x}{\sqrt{4x^2-1}}\,dx = \frac{1}{\cancel{4}_{2}} \times \cancel{2} \int du = \frac{1}{2} \times u$

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

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

let $u = \sqrt{1-x^2}$

$u^2 = 1 - x^2$

$$\cancel{2u\,du = -2x\,dx}$$

$$\cancel{dx = \frac{2u\,du}{-2x}}$$

$$\cancel{\therefore \int \frac{\sin^{-1}x}{u} \times \frac{2u\,du}{-2x}}$$

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

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

$$\frac{du}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\therefore dx = \sqrt{1-x^2}\,du$$

$$\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx = \int \frac{u}{\cancel{\sqrt{1-x^2}}} \times \cancel{\sqrt{1-x^2}}\,du$$

$$\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx = \int u\,du = \frac{u^2}{2} + c = \frac{(\sin^{-1}x)^2}{2} + c$$

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

$\cancel{\text{let } u = (\tan x)^6}$

$\cancel{\frac{du}{dx} = (\sec^2 x)^6}$

$\cancel{dx = \frac{du}{(\sec^2 x)^6}}$

$\cancel{\int (\tan x)^6 \sec^2 x \, dx = \int u \times \sec^2 x \times \frac{du}{(\sec^2 x)^6} = \int \frac{u\,du}{(\sec}}$

let $u = \tan x$

$\frac{du}{dx} = \sec^2 x$

$dx = \frac{du}{\sec^2 x}$

$\int (\tan x)^6 \sec^2 x \, dx = \int u^6 \times \cancel{\sec^2 x} \times \frac{du}{\cancel{\sec^2 x}} = \int u^6 \, du$

$\int (\tan x)^6 \sec^2 x \, dx = \frac{u^7}{7} + c = \frac{(\tan x)^7}{7} + c$