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MBBS
19/MHS01/811

① $\int \frac{2x}{\sqrt{4x^2-1}}\,dx$

Let $u = 4x^2-1$

$\frac{du}{dx} = 8x$

$dx = \frac{1}{8x}\,du$

$= \int \frac{2x}{\sqrt{u}} \cdot \frac{1}{8x}\,du$

$\frac{1}{4}\int \frac{1}{\sqrt{u}}\,du$

$\frac{1}{4}\int \frac{u^{-\frac{1}{2}+1}}{-\frac{1}{2}+1}$

$\frac{1}{4}\int \frac{1}{\sqrt{u}}\,du$

$= \frac{\sqrt{u}}{2}$

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

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

$u = \sin^{-1}(x)$

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

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

$\int \frac{u}{\sqrt{1-x^2}} \cdot \sqrt{1-x^2}\, du$

$\int u \cdot du$

$\frac{u^{n+1}}{n+1} du$

$$\frac{u^2}{2}$$

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

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

$u = \tan x$

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

$dx = \frac{1}{\sec^2(x)}\, du$

$\int \cancel{\sec^2(x)}\ \cancel{\tan^6(x)} \cdot \frac{du}{\cancel{\sec^2(x)}}$

$\int u^6$

$\int \cancel{\sec^2(x)}\ u^6 \cdot \frac{du}{\cancel{\sec^2(x)}}$

$$\int u^6 \, du$$

$$\frac{u^{6+1}}{6+1}$$

$$\frac{u^7}{7}$$

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