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① $\int \frac{2x}{\sqrt{4x^2-1}}\,dx$

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

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

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

$x = \left(\frac{u^2-1}{4}\right)^{1/2}$

$x = \frac{(u^2-1)^{1/2}}{2}$

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

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

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

We have

$\int \frac{2 \cdot (u^2-1)^{1/2}}{2} \cdot \frac{u\,du}{2(u^2-1)^{1/2}}$

u

$\int \frac{u\,du}{2} \times \frac{1}{u}$

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

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

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

$= \int \sin^{-1}$

$= \int u$

3)

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

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

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

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

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

We have

$\int u\,du$

$= \frac{u^2}{2} + C$

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

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

$u = \tan x$

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

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

We have

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

$= \frac{u^7}{7} + C$

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