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

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

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

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

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

we have

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

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

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

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

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

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

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

$\int u\,du = u^2/2 + c$

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

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

let $u = \tan x$

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

we have

$\int u^6\,du = u^7/7 + c$

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