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

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

$$\frac{\delta y}{\delta x} = \frac{1}{2} (4x^2-1)^{-1/2}$$

$$\frac{\delta y}{\delta x} = 4x(4x^2-1)^{-1/2}$$

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

hence

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

$$= \frac{1}{2} \int \delta u$$

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

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

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

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

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

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

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

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

Let $u = \tan x$

$$\delta u = \sec^2 x \delta x$$

We have

$$\int u^6 \delta u = \frac{u^7}{7} + C$$

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