

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

$$u = \tan x$$

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

$$\int u^6 du$$

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

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

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

$$x = \sin \theta$$

$$\frac{dx}{d\theta} = \cos \theta$$

$$dx = \cos \theta d\theta$$

$$\int \frac{\sin^{-1} \sin \theta \cos \theta d\theta}{\sqrt{1-\sin^2 \theta}} = \int \frac{\sin^{-1} \sin \theta \cos \theta d\theta}{\sqrt{\cos^2 \theta}}$$

$$\int \frac{\sin^{-1} \sin \theta \cancel{\cos \theta} d\theta}{\cancel{\cos \theta}}$$

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

$$\theta = \sin^{-1} x$$

$$= \int \theta d\theta = \frac{\theta^2}{2} + C$$

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

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Math 101

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

$$\int 2x \left(\frac{x}{\sqrt{4x^2-1}} \right) dx$$

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

$u = 4x^2 - 1$

$$2 \int \frac{x}{\sqrt{u}}$$

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

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

$$2 \int \frac{x}{\sqrt{u}} \cdot \frac{dy}{8x}$$

$$2 \int \left(\frac{1}{\sqrt{u}} \right) \left(\frac{1}{8} \right) dy$$

$$\frac{2}{8} \int \frac{1}{\sqrt{u}} dy$$

$$\frac{1}{4} \int \frac{1}{\sqrt{u}} dy$$

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

$$\frac{1}{4} (2\sqrt{u})$$

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

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