$$\frac{d}{dx}\sin x = \cos x$$

$$\int \cos x\,dx = \sin x + C$$

$$\frac{d}{dx}\cos x = -\sin x$$

$$\int \sin x\,dx = -\cos x + C$$

$$\frac{d}{dx}\tan x = \sec^2 x$$

$$\int \sec^2 x\,dx = \tan x + C$$

$$\frac{d}{dx}\csc x = \frac{d}{dx}\frac{1}{\sin x} = (\sin x)^{-1}$$

$$-(\sin x)^{-2}(\cos x)$$

$$\frac{-\cos x}{\sin^2 x} = -\frac{\cos x}{\sin x}\cdot\frac{1}{\sin x}$$

$$\frac{d}{dx}\csc x = -\cot x \cdot \csc x$$

$$\int \cot x \csc x\,dx = -\csc x + C$$

$$\frac{d}{dx}\cot x = \frac{\cos x}{\sin x}$$

$$= \frac{\sin x(-\sin x) - \cos x(\cos x)}{(\sin x)^2}$$

$$= -\frac{\sin^2 x - \cos^2 x}{(\sin x)^2}$$

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

$$= \frac{-1}{(\sin x)^2} = -\left(\frac{1}{\sin x}\right)^2 = -\csc^2 x$$

$$\frac{d}{dx} - \cot x = \csc^2 x$$

$$\int \csc^2 x\, dx = -\cot x + C$$

$$\int \theta^3 + \sec^2\theta \, d\theta$$

$$= \frac{\theta^4}{4} + \tan\theta + C$$

$$\int 3\sec x \tan x \, dx$$

$$3\int \sec x \tan x \, dx$$

$$3\sec x + C$$

$$\int 3x \, dx$$

$$3 \cdot \frac{x^2}{2} = \frac{3}{2}x^2 + C$$

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

$$\sin^2 x + \cos^2 x = 1$$

$$\cos^2 x = 1 - \sin^2 x$$

$$\int \frac{\sin x}{\cos^2 x} \, dx$$

$$\int \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x} \, dx$$

$$\int \tan x \sec x \, dx = \sec x + C$$