Even More Integrals involving Trig Functions

In a Nut Shell: Sometimes you just need to express trig functions in terms of their basic definition. i.e. Tangent is simply sine divided by cosine.

Example $\int \tan x \, dx = \int [\sin x / \cos x] \, dx$

$u = \cos x \qquad du = -\sin x \, dx$

$\int \tan x \, dx = -\int du / u$ which is a standard integral, (ln u)

$\int \tan x \, dx = \ln(\cos x) + C$

In similar manner $\int \cot x \, dx = \int [\cos x / \sin x] \, dx$

$u = \sin x \qquad du = \cos x \, dx$

$\int \cot x \, dx = \int du / u$ which is a standard integral, (ln u)

$\int \cot x \, dx = \ln(\sin x) + C$

In a Nut Shell: Sometimes you may need special tricks such as multiplying and dividing by the same function followed by a substitution.

Example $\int \sec x \, dx$

Multiply and divide sec x by (sec x + tanx)

and let $u = \sec x + \tan x$, $du = (\sec x \tan x + \sec^2 x) \, dx$

So integral becomes $\int du / u = \ln |u| + C$

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

Use similar strategy for $\int \csc x \, dx$ (don’t forget – sign)

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