Recall the definitions of the trigonometric functions.

* $ \displaystyle{ \tan x = { \sin x \over \cos x } } $
* $ \displaystyle{ \sec x = { 1 \over \cos x } } $
* $ \displaystyle{ \cot x = { \cos x \over \sin x } = { 1 \over \tan x } } $
* $ \displaystyle{ \csc x = { 1 \over \sin x } } $

The following indefinite integrals involve all of these well-known trigonometric functions. Some of the following trigonometry identities may be needed.

* A.) $ \cos^2 x + \sin^2 x = 1 $
* B.) $ \sin 2x = 2 \sin x \cos x $
* C.) $ \cos 2x = 2 \cos^2 x - 1 $ so that $ \cos^2 x = \displaystyle{ 1+\cos 2x \over 2}$
* D.) $ \cos 2x = 1 - 2 \sin^2 x $ so that $ \sin^2 x = \displaystyle{ 1-\cos 2x \over 2} $
* E.) $ \cos 2x = \cos^2 x - \sin^2 x $
* F.) $ 1 + \tan^2 x = \sec^2 x $ so that $ \tan^2 x = \sec^2 x - 1 $
* G.) $ 1 + \cot^2 x = \csc^2 x $ so that $ \cot^2 x = \csc^2 x - 1 $

It is assumed that you are familiar with the following rules of differentiation.

* $ D (\sin x) = \cos x $
* $ D (\cos x) = - \sin x $
* $ D (\tan x) = \sec^2 x $
* $ D (\cot x) = - \csc^2 x $
* $ D (\sec x) = \sec x \tan x $
* $ D (\csc x) = - \csc x \cot x $

These lead directly to the following indefinite integrals.

* 1.) $ \displaystyle{ \int \cos x \, \ dx } \ = \ \sin x + C $
* 2.) $ \displaystyle{ \int \sin x \, \ dx } \ = \ - \cos x + C $
* 3.) $ \displaystyle{ \int \sec^2 x \, \ dx } \ = \ \tan x + C $
* 4.) $ \displaystyle{ \int \csc^2 x \, \ dx } \ = \ - \cot x + C $
* 5.) $ \displaystyle{ \int \sec x \tan x \, \ dx } \ = \ \sec x + C $
* 6.) $ \displaystyle{ \int \csc x \cot x \, \ dx } \ = \ - \csc x + C $

The next four indefinite integrals result from trig identities and u-substitution.

* 7.) $ \displaystyle{ \int \tan x \, \ dx } \ = \ \ln \vert \sec x \vert + C $
* 8.) $ \displaystyle{ \int \cot x \, \ dx } \ = \ \ln \vert \sin x \vert + C $
* 9.) $ \displaystyle{ \int \sec x \, \ dx } \ = \ \ln \vert \sec x + \tan x\vert + C $
* 10.) $ \displaystyle{ \int \csc x \, \ dx } \ = \ \ln \vert \csc x - \cot x \vert + C $

We will assume knowledge of the following well-known, basic indefinite integral formulas :

* $ \displaystyle{ \int x^n \,dx } = \displaystyle{ {x^{n+1} \over n+1 } + C } $ , where $ n $ is a constant $ (n \ne -1 ) $
* $ \displaystyle{ \int { 1 \over x } \,dx } = \displaystyle{ \ln \vert x\vert + C } $
* $ \displaystyle{ \int e^x \,dx } = \displaystyle{ e^x + C } $
* $ \displaystyle{ \int k f(x) \,dx } = k \displaystyle{ \int f(x) \,dx } $ , where $ k $ is a constant
* $ \displaystyle{ \int ( f(x) \pm g(x) ) \,dx } = \displaystyle{ \int f(x) \,dx } \pm \displaystyle{ \int g(x) \,dx } $

