

Answer on Question #53147 – Math – Integral Calculus

Question

Integrate $\int \left(\sin x + \frac{\cos x}{\tan x} \right) dx$.

Solution

$$\begin{aligned} \int \left(\sin x + \frac{\cos x}{\tan x} \right) dx &= \int \left(\sin x + \frac{(\cos x)^2}{\sin x} \right) dx = \int \frac{dx}{\sin x} = \int \frac{\sin x}{(\sin x)^2} dx = \\ &= - \int \frac{d(\cos x)}{1-(\cos x)^2} = \{\cos x = u\} = - \int \frac{du}{1-u^2} = \int \frac{du}{u^2-1} = \frac{1}{2} \ln \left| \frac{u-1}{u+1} \right| + c = \frac{1}{2} \ln \left| \frac{\cos x-1}{\cos x+1} \right| + c, \end{aligned}$$

where c is an arbitrary real constant.

Answer. $\frac{1}{2} \ln \left| \frac{\cos x-1}{\cos x+1} \right| + c$.