Integral of $\tan(x)$

Stephen Styles

September 27, 2020

$$\int \tan(x)\,dx = \int \frac{\sin(x)}{\cos(x)}\,dx$$

Let $u = \cos(x)$, then $du = -\sin(x)\,dx$

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

Therefore:

$$\int \tan(x)\,dx = -\ln\left|\cos(x)\right| + C = \ln\left|\sec(x)\right| + C$$