

Answer on Question #45857 – Math - Integral Calculus

Determine the $\int \sec 2x$ with respect to x .

Solution

$$I = \int \sec 2x \, dx = \int \frac{\sec 2x(\sec 2x + \tan 2x)}{\sec 2x + \tan 2x} \, dx$$

$$\begin{aligned} \text{Substitute } u = \sec 2x + \tan 2x &\rightarrow du = (2\tan 2x \sec 2x + 2\sec^2 2x) \, dx = \\ &= 2\sec 2x(\tan 2x + \sec 2x) \, dx \end{aligned}$$

$$\text{So, } I = \frac{1}{2} \int \frac{du}{u} = \frac{1}{2} \ln|u| + \text{Const} = \frac{1}{2} \ln|\sec 2x + \tan 2x| + \text{Const} =$$

$$= \frac{1}{2} \ln \left| \frac{1 + \sin 2x}{\cos 2x} \right| + \text{Const} = \frac{1}{2} \ln|1 + \sin 2x| - \frac{1}{2} \ln|\cos 2x| + \text{Const}.$$