

Solution (#1352) Let

$$I_n = \int \tan^n \theta \, d\theta.$$

Recalling that $\tan^2 \theta = \sec^2 \theta - 1$, we have for $n \geq 2$ that

$$\begin{aligned} I_n &= \int \tan^{n-2} \theta (\sec^2 \theta - 1) \, d\theta \\ &= \int \tan^{n-2} \theta \sec^2 \theta \, d\theta - I_{n-2} \\ &= \frac{\tan^{n-1} \theta}{n-1} - I_{n-2}. \end{aligned}$$