$$\int \cot^2 x \, dx$$

Solution

Recall that $1 + \cot^2 x = \csc^2 x$. Also recall that the derivative of $\cot x$ is $-\csc^2 x$, so the derivative of $-\cot x$ is $\csc^2 x$.

$$\int \cot^2 x \, dx = \int (\csc^2 x - 1) \, dx = -\cot x - x + C.$$