$$\int \csc u du = -\ln|\csc u + \cot u| + C$$

Proof

$$\int \csc u du = \int \csc u \left(\frac{\csc u + \cot u}{\csc u + \cot u} \right) du = \int \frac{\csc^2 u + \csc u \cot u}{\csc u + \cot u} du$$

Let $v = \csc u + \cot u$

$$dv = (-\csc u \cot u - \csc^2 u) du = -(\csc u \cot u + \csc^2 u) du$$

$$\therefore \int \frac{\csc^2 u + \csc u \cot u}{\csc u + \cot u} du = -\int \frac{dv}{v} = -\ln|\csc u + \cot u| + C$$

Q.E.D