

**PROOF OF FORMULA 3.747.7**

$$\int_0^{\pi/2} x \cot x \, dx = \frac{\pi}{2} \ln 2$$

Integrate by parts to obtain

$$\begin{aligned} \int_0^{\pi/2} x \cot x \, dx &= \int_0^{\pi/2} x \frac{d}{dx} \ln \sin x \, dx \\ &= - \int_0^{\pi/2} \ln \sin x \, dx. \end{aligned}$$

The boundary terms vanish and the last integral is

$$\int_0^{\pi/2} \ln \sin x \, dx = -\frac{\pi}{2} \ln 2,$$

from formula 4.224.3.