PROOF OF FORMULA 3.747.8

$$\int_0^{\pi/4} x \cot x \, dx = \frac{\pi}{8} \ln 2 + \frac{G}{2}$$

Integrate by parts to obtain

$$\int_0^{\pi/4} x \cot x \, dx = x \ln \sin x \, (\text{ at } \tfrac{\pi}{4}) - \int_0^{\pi/4} \ln \sin x \, dx.$$

Entry 4.224.2 gives

$$\int_0^{\pi/4} \ln \sin x \, dx = -\frac{\pi}{4} \ln 2 - \frac{G}{2}.$$

This gives the result.