

PROOF OF FORMULA 3.747.6

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

Write

$$\tan x = -\frac{d}{dx} \ln \cos x$$

and integrate by parts to obtain

$$\int_0^{\pi/4} x \tan x \, dx = \frac{\pi}{8} \ln 2 + \int_0^{\pi/4} \ln \cos x \, dx.$$

The result now follows from entry **4.224.5** that gives

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