

**PROOF OF FORMULA 3.747.9**

$$\int_0^{\pi/2} \left(\frac{\pi}{2} - x\right) \tan x \, dx = \frac{1}{2} \int_0^{\pi} \left(\frac{\pi}{2} - x\right) \tan x \, dx = \frac{\pi}{2} \ln 2$$

Let  $s = \frac{\pi}{2} - x$  to obtain

$$\int_0^{\pi/2} \left(\frac{\pi}{2} - x\right) \tan x \, dx = \int_0^{\pi/2} s \cot s \, ds.$$

Write

$$\cot s = \frac{d}{ds} \ln \sin s$$

to integrate by parts. The result now follows from entry **4.224.3**

$$\int_0^{\pi/2} \ln \sin s \, ds = -\frac{\pi}{2} \ln 2.$$