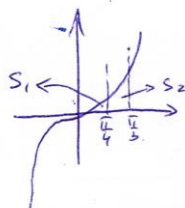


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$$y = \ln \cos x \rightarrow y' = \frac{-\sin x}{\cos x} = -\tan x$$



$$S_1 = \int_0^{\frac{\pi}{4}} \tan x \, dx = -\ln \cos x \Big|_0^{\frac{\pi}{4}} = -\ln \frac{\sqrt{2}}{2} + \ln 1 = -\ln \frac{\sqrt{2}}{2}$$

$$= -\ln 2^{-\frac{1}{2}} = \ln 2^{\frac{1}{2}} = \ln \sqrt{2}$$

$$S_2 = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \tan x \, dx = -\ln \cos x \Big|_{\frac{\pi}{4}}^{\frac{\pi}{2}} = -\ln \frac{1}{2} + \ln \cos \frac{\pi}{4} =$$

$$-\ln 2^{-1} + \ln \frac{\sqrt{2}}{2} = \ln 2 + \ln 2^{-\frac{1}{2}} = \ln 2 \cdot 2^{-\frac{1}{2}} = \ln 2^{\frac{1}{2}} = \ln \sqrt{2}$$