# PROOF OF FORMULA 3.411.32

$$\int_0^\infty \frac{e^{-px} - e^{(p-q)x}}{e^{-qx}+1} \frac{dx}{x} = \ln\left(\cot \frac{\pi p}{2q}\right)$$

The change of variable $t = e^{-px}$ gives

$$\int_0^\infty \frac{e^{-px} - e^{(p-q)x}}{e^{-qx}+1} \frac{dx}{x} = \int_0^1 \frac{t^{-p/q} - t^{p/q-1}}{1+t} \frac{dt}{\ln t}.$$

The value of this integral appears in entry 4.267.10.