

PROOF OF FORMULA 3.351.6

$$\int_{-\infty}^u \frac{e^x}{x} dx = \text{li}(u) = \text{Ei}(u)$$

This is the definition of $\text{Ei}(u)$. The relation to

$$\text{li}(a) = \int_0^a \frac{dt}{\ln t}$$

comes from the change of variables $\ln t = x$.