

PROOF OF FORMULA 3.352.3

$$\int_a^b \frac{e^{-\mu x}}{x+c} dx = e^{\mu b} [\text{Ei}(-\mu[c+b]) - \text{Ei}(-\mu[c+a])]$$

The exponential integral is defined by

$$\text{Ei}(x) = - \int_{-x}^{\infty} \frac{e^{-t}}{t} dt.$$

The change of variable $t = x + c$ gives

$$\int_a^b \frac{e^{-\mu x}}{x+c} dx = e^{\mu b} \int_{a+c}^{b+c} \frac{e^{-\mu t}}{t} dt.$$

Now let $s = \mu t$ to produce the result.