

PROOF OF FORMULA 3.352.2

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

The exponential integral is defined by

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

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

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

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