PROOF OF FORMULA 3.381.3

$$\int_a^\infty x^{\nu-1}e^{-\mu x}\,dx = \mu^{-\nu}\Gamma(\nu, a\mu)$$

The *incomplete gamma* function is defined in **8.350.2** as

$$\Gamma(\alpha, x) = \int_x^\infty t^{\alpha-1}e^{-t}\,dt.$$

The change of variables $t = \mu x$ gives

$$\int_a^\infty x^{\nu-1}e^{-\mu x}\,dx = \mu^{-\nu}\int_{a\mu}^\infty t^{\nu-1}e^{-t}\,dt.$$

The second integral is given by the incomplete gamma function.