PROOF OF FORMULA 3.381.1

$$\int_0^a x^{\nu-1} e^{-\mu x}\, dx = \mu^{-\nu}\gamma(\nu, a\mu)$$

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

$$\int_0^a x^{\nu-1} e^{-\mu x}\, dx = \mu^{-\nu} \int_0^{a\mu} t^{\nu-1} e^{-t}\, dt.$$

The result now follows from the definition of the incomplete gamma function

$$\gamma(a, x) = \int_0^x e^{-t} t^{a-1}\, dt.$$