PROOF OF FORMULA 3.382.1

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

The function appearing in the answer is the *incomplete gamma function*

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

defined in **8.350.1**.

Let $s = a - x$ to obtain

$$\int_0^a (a-x)^\nu e^{\mu x}\, dx = e^{a\mu} \int_0^a s^\nu e^{-s\mu}\, ds.$$

The change of variables $t = s\mu$ to obtain

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

The formula is established.