

PROOF OF FORMULA 3.382.5

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

The incomplete gamma function is defined by

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

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

$$\int_0^b (a+x)^{\mu-1} e^{-x} dx = e^a \int_a^{a+b} e^{-t} t^{\mu-1} dt.$$

The result follows directly from here.