

PROOF OF FORMULA 4.215.1

$$\int_0^1 \left(\ln \frac{1}{x}\right)^{\mu-1} dx = \Gamma(\mu)$$

Let $t = \ln \frac{1}{x}$ to produce

$$\int_0^1 \left(\ln \frac{1}{x}\right)^{\mu-1} dx = \int_0^\infty t^{\mu-1} e^{-t} dt.$$

This is the standard integral representation of the gamma function.