PROOF OF FORMULA 3.328

$$\int_{-\infty}^{\infty} e^{-e^x} e^{\mu x}\, dx = \Gamma(\mu)$$

Let $y = e^x$ to get

$$\int_{-\infty}^{\infty} e^{-e^x} e^{\mu x}\, dx = \int_{0}^{\infty} y^{\mu-1} e^{-y} dy.$$

This is the integral representation of the gamma function.