ENTRIES IN PART 3

4.331.1 $$\int_0^\infty e^{-\mu x} \ln x \, dx = -\frac{1}{\mu}(\gamma + \ln \mu)$$

4.335.1 $$\int_0^\infty e^{-\mu x} \ln^2 x \, dx = \frac{1}{\mu}\left[\frac{\pi^2}{6} + (\gamma + \ln \mu)^2\right]$$

4.335.3 $$\int_0^\infty e^{-\mu x} \ln^3 x \, dx = -\frac{1}{\mu}\left[(\gamma + \ln \mu)^3 + \frac{\pi^2}{2}(\gamma + \ln \mu)^2 - \psi''(1)\right]$$

4.352.1 $$\int_0^\infty x^{\nu-1} e^{-\mu x} \ln x \, dx = \frac{\Gamma(\nu)}{\mu^\nu}\left[\psi(\nu) - \ln \mu\right]$$

4.352.2 $$\int_0^\infty x^n e^{-\mu x} \ln x \, dx = \frac{n!}{\mu^{n+1}}\left[1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n} - \gamma - \ln \mu\right]$$

4.352.3 $$\int_0^\infty x^{n-\frac{1}{2}} e^{-\mu x} \ln x \, dx = \frac{\sqrt{\pi}\,(2n-1)!!}{2^n \mu^{n+\frac{1}{2}}}\left[2\left(1 + \frac{1}{3} + \frac{1}{5} + \cdots + \frac{1}{2n-1}\right) - \gamma - \ln 4\mu\right]$$

4.352.4 $$\int_0^\infty x^{\nu-1} e^{-x} \ln x \, dx = \Gamma'(\mu)$$

4.353.1 $$\int_0^\infty (x-\nu)^{\nu-1} e^{-x} \ln x \, dx = \Gamma(\nu)$$

4.353.2 $$\int_0^\infty (\mu x - n - \tfrac{1}{2}) x^{n-\frac{1}{2}} e^{-\mu x} \ln x \, dx = \frac{(2n-1)!!}{(2\mu)^n}\sqrt{\frac{\pi}{\mu}}$$