ENTRIES IN PART 4

3.324.2 $$\int_{-\infty}^{\infty} \exp\left[-(x-b/x)^{2n}\right]\,dx = \frac{1}{n}\Gamma\left(\frac{1}{2n}\right)$$

3.326.1 $$\int_0^{\infty} \exp(-x^{\mu})\,dx = \frac{1}{\mu}\Gamma\left(\frac{1}{\mu}\right)$$

3.326.2 $$\int_0^{\infty} x^m \exp(-\beta x^n)\,dx = \frac{\Gamma(c)}{n\beta^c} \text{ with } c = \frac{m+1}{n}$$

3.328 $$\int_{-\infty}^{\infty} \exp(-e^x)\,e^{\mu x}\,dx = \Gamma(\mu)$$

3.351.3 $$\int_0^{\infty} x^n e^{-\mu x}\,dx = \frac{n!}{\mu^{n+1}}$$

3.371 $$\int_0^{\infty} x^{n-1/2} e^{-\mu x}\,dx = \frac{\sqrt{\pi}(2n-1)!!}{2^n \mu^{n+1/2}}$$

3.381.4 $$\int_0^{\infty} x^{\nu-1} e^{-\mu x}\,dx = \frac{\Gamma(\nu)}{\mu^{\nu}}$$

3.382.2 $$\int_a^{\infty} (x-a)^{\nu} e^{-\mu x}\,dx = \frac{e^{-a\mu}}{\mu^{\nu+1}}\Gamma(\nu+1)$$

3.434.1 $$\int_0^{\infty} \frac{e^{-ax}-e^{-bx}}{x^{c+1}}\,dx = \frac{b^c-a^c}{c}\Gamma(1-c)$$

3.434.2 $$\int_0^{\infty} \frac{e^{-ax}-e^{-bx}}{x}\,dx = \ln\frac{b}{a}$$

3.461.2 $$\int_0^{\infty} x^{2n} e^{-px^2}\,dx = \frac{(2n-1)!!}{2(2p)^n}\sqrt{\frac{\pi}{p}}$$

3.461.3 $$\int_0^{\infty} x^{2n+1} e^{-px^2}\,dx = \frac{n!}{2p^{n+1}}$$

3.462.9 $$\int_0^{\infty} \exp(-\beta x^n \pm a)\,dx = \frac{e^{\pm a}}{n\beta^{1/n}}\Gamma\left(\frac{1}{n}\right)$$

3.471.3 $$\int_0^{a} x^{-\mu-1}(a-x)^{\mu-1} e^{-b/x}\,dx = \beta^{-\mu} a^{\mu-1}\Gamma(\mu)\,\exp\left(-\frac{b}{a}\right)$$

3.473 $$\int_0^\infty x^{(m+1/2)n-1}\exp(-x^n)\,dx = \frac{(2m-1)!!}{2^m n}\sqrt{\pi}$$

3.478.1 $$\int_0^\infty x^{\nu-1}e^{-\mu x^p}\,dx = \frac{1}{p\mu^{\nu/p}}\Gamma\left(\frac{\nu}{p}\right)$$

3.478.2 $$\int_0^\infty x^{\nu-1}\left(1-e^{-\mu x^p}\right)\,dx = -\frac{1}{|p|\mu^{\nu/p}}\Gamma\left(\frac{\nu}{p}\right)$$

3.481.1 $$\int_{-\infty}^\infty xe^x\exp(-\mu e^x)\,dx = -\frac{\gamma+\ln\mu}{\mu}$$

3.481.2 $$\int_{-\infty}^\infty xe^x\exp(-\mu e^{2x})\,dx = -\frac{\gamma+\ln 4\mu}{4}\sqrt{\frac{\pi}{\mu}}$$

4.215.1 $$\int_0^1 \left(\ln\frac{1}{x}\right)^{\mu-1}\,dx = \Gamma(\mu)$$

4.215.2 $$\int_0^1 \left(\ln\frac{1}{x}\right)^{-\mu}\,dx = \frac{\pi}{\Gamma(\mu)\,\sin\pi\mu}$$

4.215.3 $$\int_0^1 \sqrt{\ln\frac{1}{x}}\,dx = \frac{\sqrt{\pi}}{2}$$

4.215.4 $$\int_0^1 \frac{dx}{\sqrt{\ln 1/x}} = \sqrt{\pi}$$

4.229.1 $$\int_0^1 \ln\left(\ln\frac{1}{x}\right)\,dx = \gamma$$

4.229.3 $$\int_0^1 \ln\left(\ln\frac{1}{x}\right)\left(\ln\frac{1}{x}\right)^{-1/2}\,dx = -(\gamma+2\ln 2)\sqrt{\pi}$$

4.229.4 $$\int_0^1 \ln\left(\ln\frac{1}{x}\right)\left(\ln\frac{1}{x}\right)^{\mu-1}\,dx = \psi(\mu)\Gamma(\mu)$$

4.269.3 $$\int_0^1 x^{p-1}\sqrt{\ln\frac{1}{x}}\,dx = \frac{1}{2}\sqrt{\frac{\pi}{p^3}}$$

4.272.5 $$\int_1^\infty \frac{\ln^p x}{x^2}\,dx = \Gamma(1+p)$$

4.272.6 $$\int_0^1 \left(\ln\frac{1}{x}\right)^{\mu-1} x^{\nu-1}\,dx = \frac{\Gamma(\mu)}{\nu^\mu}$$

4.272.7 $$\int_0^1 \left(\ln\frac{1}{x}\right)^{n-1/2} x^{\nu-1}\,dx = \frac{(2n-1)!!}{(2\nu)^n}\sqrt{\frac{\pi}{\nu}}$$

4.325.8 $$\int_0^1 \ln\ln\left(\frac{1}{x}\right) x^{\nu-1}\,dx = -\frac{\gamma+\ln\nu}{\nu}$$

4.325.11 $$\int_0^1 \ln\ln\left(\frac{1}{x}\right)\left(\ln\frac{1}{x}\right)^{-1/2} x^{\nu-1}\,dx = -(\gamma+\ln 4\nu)\sqrt{\frac{\pi}{\nu}}$$

4.325.12 $$\int_0^1 \ln\ln\left(\frac{1}{x}\right)\left(\ln\frac{1}{x}\right)^{\mu-1} x^{\nu-1}\,dx = (\psi(\mu)-\ln\nu)\,\frac{\Gamma(\mu)}{\nu^{\mu}}$$

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

4.333 $$\int_0^\infty e^{-\mu x^2}\ln x\,dx = -\frac{\gamma+\ln 4\mu}{4}\sqrt{\frac{\pi}{\mu}}$$

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

4.355.1 $$\int_0^\infty x^2 e^{-\mu x^2}\ln x\,dx = \frac{2-\ln 4\mu-\gamma}{8\mu}\sqrt{\frac{\pi}{\mu}}$$

4.355.3 $$\int_0^\infty (\mu x^2-n)x^{2n-1}e^{-\mu x^2}\ln x\,dx = \frac{(n-1)!}{4\mu^n}$$

4.355.4 $$\int_0^\infty (2\mu x^2-2n-1)x^{2n}e^{-\mu x^2}\ln x\,dx = \frac{(2n-1)!!}{2(2\mu)^n}\sqrt{\frac{\pi}{\mu}}$$

4.358.2 $$\int_0^\infty x^{\nu-1}e^{-\mu x}\ln^2 x\,dx = \frac{\Gamma(\nu)}{\mu^\nu}\left\{[\psi(\nu)-\ln\mu]^2+\zeta(2,\nu)\right\}$$

4.358.3 $$\int_0^\infty x^{\nu-1}e^{-\mu x}\ln^3 x\,dx = \frac{\Gamma(\nu)}{\mu^\nu}\left\{[\psi(\nu)-\ln\mu]^3++3\zeta(2,\nu)\left[\psi(\nu)-\ln\mu\right]-2\zeta(3,\nu)\right\}$$

4.358.4 $$\int_0^\infty x^{\nu-1}e^{-\mu x}\ln^4 x\,dx = \frac{\Gamma(\nu)}{\mu^\nu}\{[\psi(\nu)-\ln\mu]^4++6\zeta(2,\nu)\left[\psi(\nu)-\ln\mu\right]^2$$
$$-8\zeta(3,\nu)\left[\psi(\nu)-\ln\mu\right]++3\zeta^2(3,\nu)+6\zeta(4,\nu)\}$$

4.358.5 $$\int_0^\infty x^{\nu-1}e^{-\mu x}\ln^n x\,dx = \frac{\partial^n}{\partial\nu^n}\left(\frac{\Gamma(\nu)}{\mu^\nu}\right)$$

4.369.1 $$\int_0^\infty x^{\nu-1}e^{-\mu x}\left[\psi(\nu)-\ln x\right]\,dx = \frac{\Gamma(\nu)\ln\mu}{\mu^\nu}$$

4.369.2 $$\int_0^\infty x^n e^{-\mu x}\left\{\left[\ln x-\tfrac{1}{2}\psi(n+1)\right]^2-\tfrac{1}{2}\psi'(n+1)\right\}\,dx =$$
$$\frac{n!}{\mu^{n+1}}\left\{\left[\ln\mu-\tfrac{1}{2}\psi(n+1)\right]^2+\tfrac{1}{2}\psi'(n+1)\right\}$$