## ENTRIES IN PART 7

**2.321.1** $$\int x^n e^{ax}\,dx = \frac{x^n e^{ax}}{a} - \frac{n}{a}\int x^{n-1}e^{ax}\,dx$$

**2.321.2** $$\int x^n e^{ax}\,dx = e^{ax}\left(\sum_{k=0}^{n} \frac{(-1)^k k!\binom{n}{k}}{a^{k+1}} x^{n-k}\right)$$

**2.322.1** $$\int x e^{ax}\,dx = e^{ax}\left(\frac{x}{a} - \frac{1}{a^2}\right)$$

**2.322.2** $$\int x^2 e^{ax}\,dx = e^{ax}\left(\frac{x^2}{a} - \frac{2x}{a^2} + \frac{2}{a^3}\right)$$

**2.322.3** $$\int x^3 e^{ax}\,dx = e^{ax}\left(\frac{x^3}{a} - \frac{3x^2}{a^2} + \frac{6x}{a^3} - \frac{6}{a^4}\right)$$

**2.322.4** $$\int x^4 e^{ax}\,dx = e^{ax}\left(\frac{x^4}{a} - \frac{4x^3}{a^2} + \frac{12x^2}{a^3} - \frac{24x}{a^4} + \frac{24}{a^5}\right)$$

**3.195** $$\int_0^\infty \frac{(1+x)^{p-1}\,dx}{(a+x)^{p+1}} = \begin{cases} \frac{1-a^{-p}}{p(a-1)} & p \neq 0,\ a>0,\ a\neq 1 \\ \frac{\ln a}{a-1} & p=0,\ a>0,\ a\neq 1 \\ 1 & a=1 \end{cases}$$

**3.248.4** $$\int_{-\infty}^{\infty} \frac{dx}{(1+x^2)\sqrt{4+3x^2}} = \frac{\pi}{4}$$

**3.248.6** $$\int_{-\infty}^{\infty} \frac{dx}{(1+x^2)\sqrt{b+ax^2}} = \begin{cases} \frac{2}{\sqrt{b-a}}\tan^{-1}\left(\sqrt{b/a-1}\right) & \text{if } a<b \\ \frac{2}{\sqrt{a}} & \text{if } a=b \\ \frac{1}{\sqrt{a-b}}\ln\left(\frac{\sqrt{a}+\sqrt{a-b}}{\sqrt{a}-\sqrt{a-b}}\right) & \text{if } a>b \end{cases}$$

**3.249.1** $$\int_0^\infty \frac{dx}{(x^2+a^2)^n} = \frac{(2n-3)!!}{2\cdot(2n-2)!!}\,\frac{\pi}{a^{2n-1}}$$

**3.249.6** $$\int_0^1 (1-\sqrt{x})^{p-1}\,dx = \frac{2}{p(p+1)}$$

**3.252.1** $$\int_0^\infty \frac{dx}{(ax^2+bx+c)^n} = \frac{(-1)^{n-1}}{(n-1)!}\,\frac{\partial^{n-1}}{\partial c^{n-1}}\left[\frac{1}{\sqrt{ac-b^2}}\text{arccot}\frac{b}{\sqrt{ac-b^2}}\right]$$

**3.252.2** $$\int_{-\infty}^{\infty} \frac{dx}{(ax^2+bx+c)^n} = \frac{(2n-3)!!\pi a^{n-1}}{(2n-2)!!(ac-b^2)^{n-\frac{1}{2}}}$$

**3.252.3** $$\int_{0}^{\infty} \frac{dx}{(ax^2+bx+c)^{n+\frac{3}{2}}} = \frac{(-2)^n}{(2n+1)!!}\frac{\partial^n}{\partial c^n}\left[\frac{1}{\sqrt{c}\,(\sqrt{ac}+b)}\right]$$

**3.268.1** $$\int_0^1 \left(\frac{1}{1-x} - \frac{px^{p-1}}{1-x^p}\right) dx = \ln p$$

**3.310** $$\int_0^\infty e^{-px}\, dx = \frac{1}{p}$$

**3.311.1** $$\int_0^\infty \frac{dx}{1+e^{px}} = \frac{\ln 2}{p}$$

**3.351.1** $$\int_0^a x^n e^{-\mu x}\, dx = \frac{n!}{\mu^{n+1}} - e^{-\mu a}\sum_{k=0}^{n} \frac{n!}{k!}\frac{a^k}{\mu^{n-k+1}} = \mu^{-n-1}\gamma(n+1,\mu a)$$

**3.351.2** $$\int_a^\infty x^n e^{-\mu x}\, dx = e^{-\mu a}\sum_{k=0}^{n} \frac{n!}{k!}\frac{a^k}{\mu^{n-k+1}} = \mu^{-n-1}\Gamma(n+1,\mu a)$$

**3.351.7** $$\int_0^a x e^{-\mu x}\, dx = \frac{1}{\mu^2} - \frac{e^{-\mu a}}{\mu^2}(1+\mu a)$$

**3.351.8** $$\int_0^a x^2 e^{-\mu x}\, dx = \frac{2}{\mu^3} - \frac{e^{-\mu a}}{\mu^3}(2+2\mu a+\mu^2 a^2)$$

**3.351.9** $$\int_0^a x^3 e^{-\mu x}\, dx = \frac{6}{\mu^4} - \frac{e^{-\mu a}}{\mu^4}(6+6\mu a+3\mu^2 a^2+\mu^3 a^3)$$

**3.353.4** $$\int_0^1 \frac{xe^x\, dx}{(1+x)^2} = \frac{e}{2} - 1$$

**3.411.19** $$\int_0^\infty e^{-px}(e^{-x}-1)^n \frac{dx}{x} = -\sum_{k=0}^{n}(-1)^k\binom{n}{k}\ln(p+n-k)$$

**3.411.20** $$\int_0^\infty e^{-px}(e^{-x}-1)^n \frac{dx}{x^2} = \sum_{k=0}^{n}(-1)^k\binom{n}{k}(p+n-k)\,\ln(p+n-k)$$

**3.471.1** $$\int_0^u \frac{e^{-b/x}}{x^2} dx = \frac{1}{b}e^{-b/u}$$

**3.622.3** $$\int_0^{\pi/4} \tan^{2n} x\, dx = (-1)^n\frac{\pi}{4} + \sum_{k=0}^{n-1}\frac{(-1)^k}{2n-2k-1}$$

**3.622.4** $$\int_0^{\pi/4} \tan^{2n+1} x\, dx = (-1)^n\frac{\ln 2}{2} + \sum_{k=0}^{n-1}\frac{(-1)^k}{2n-2k}$$

**4.212.7** $$\int_1^e \frac{\ln x\,dx}{(1+\ln x)^2} = \frac{e}{2} - 1$$

**4.222.1** $$\int_0^\infty \ln \frac{a^2+x^2}{b^2+x^2}\,dx = (a-b)\pi$$