Integral Table (a, b = constants; n, m = integers)

$\int u\,dv = uv - \int v\,du$ $\qquad \int x^n\,dx = x^{n+1}/(n+1)$ $\qquad \int \ln x\,dx = x\ln x - x$

$$\int \frac{dx}{a+bx} = \frac{1}{b}\ln(a+bx) \qquad \int \frac{x\,dx}{a+bx} = \frac{1}{b^2}[a+bx-a\ln(a+bx)]$$

$$\int \frac{dx}{x(a+bx)} = \frac{1}{a}\ln\left(\frac{x}{a+bx}\right) \qquad \int \frac{dx}{(a+bx)(a'+b'x)} = \frac{1}{ab'-a'b}\ln\left(\frac{a'+b'x}{a+bx}\right)$$

$$\int \frac{dx}{(a+bx)^2(a'+b'x)} = \frac{1}{ab'-a'b}\left[\frac{1}{a+bx} + \frac{b'}{ab'-a'b}\ln\left(\frac{a'+b'x}{a+bx}\right)\right]$$

Gaussian Functions

$$\int_0^\infty e^{-ax^2}\,dx = \frac{1}{2}\left(\frac{\pi}{a}\right)^{1/2} \qquad \int_0^\infty x\,e^{-ax^2}\,dx = \frac{1}{2a}$$

$$\int_0^\infty x^2 e^{-ax^2}\,dx = \frac{1}{4a}\left(\frac{\pi}{a}\right)^{1/2} \qquad \int_0^\infty x^3 e^{-ax^2}\,dx = \frac{1}{2a^2}$$

$$\int_0^\infty x^4 e^{-ax^2}\,dx = \frac{3}{8a^2}\left(\frac{\pi}{a}\right)^{1/2} \qquad \int_0^\infty x^5 e^{-ax^2}\,dx = \frac{1}{a^3}$$

$$\int_0^\infty x^{2n} e^{-ax^2}\,dx = \frac{1\cdot 3\cdot 5\cdots(2n-1)}{2^{n+1}a^n}\left(\frac{\pi}{a}\right)^{1/2} \qquad \int_0^\infty x^{2n+1} e^{-ax^2}\,dx = \frac{n!}{2}\left(\frac{1}{a^{n+1}}\right)$$

$$\int_0^\infty e^{-x^2/2\sigma_x^2}\,dx = \tfrac{1}{2}(2\pi)^{1/2}\sigma_x \qquad \int_0^\infty x^2 e^{-x^2/2\sigma_x^2}\,dx = \frac{2\sigma_x^2}{4}(2\pi)^{1/2}\sigma_x$$

$$\frac{2}{\sqrt{\pi}}\int_0^t e^{-y^2}\,dy = \mathrm{erf}(t) \qquad \frac{1}{\sqrt{2\pi}}\int_0^z e^{-x^2/2}\,dx = \tfrac{1}{2}\,\mathrm{erf}(z/\sqrt{2})$$

$$\frac{1}{\sigma_x\sqrt{2\pi}}\int_0^{x_c} e^{-x^2/2\sigma_x^2}\,dx = \tfrac{1}{2}\,\mathrm{erf}\left(\frac{x_c}{\sigma_x\sqrt{2}}\right) \qquad \int_0^{x_c} e^{-ax^2}\,dx = \tfrac{1}{2}\left(\frac{\pi}{a}\right)^{1/2}\mathrm{erf}(\sqrt{a}\,x_c)$$

z	0.1	0.2	0.3	0.4	0.5	0.8	1.0	1.41421	1.64485	2.0
$t = z/\sqrt{2}$	0.07071	0.14142	0.21213	0.28284	0.35355	0.56569	0.70711	1.00000	1.16309	1.41421
erf(t)	0.07966	0.15852	0.23582	0.31084	0.38292	0.57629	0.68269	0.84270	0.90000	0.95450

Exponential Functions ($a > 0$)

$$\int_0^\infty x^{-1/2} e^{-ax}\,dx = \sqrt{\pi}/a^{1/2}$$

$$\int_0^\infty x^{1/2} e^{-ax}\,dx = \sqrt{\pi}/(2a^{3/2})$$

$$\int x^n e^{-ax}\,dx = -\frac{x^n e^{-ax}}{a} + \frac{n}{a}\int x^{n-1} e^{-ax}\,dx \qquad \int_0^\infty x^n e^{-ax}\,dx = n!/a^{n+1}$$

$$\int e^{-ax}\,dx = -\frac{e^{-ax}}{a} \qquad \int_0^\infty e^{-ax}\,dx = 1/a$$

$$\int x\,e^{-ax}\,dx = -\frac{x\,e^{-ax}}{a} - \frac{e^{-ax}}{a^2} \qquad \int_0^\infty x\,e^{-ax}\,dx = 1/a^2$$

$$\int x^2 e^{-ax}\,dx = -\frac{x^2 e^{-ax}}{a} - \frac{2x\,e^{-ax}}{a^2} - \frac{2\,e^{-ax}}{a^3} \qquad \int_0^\infty x^2 e^{-ax}\,dx = 2/a^3$$

$$\int x^3 e^{-ax}\,dx = -\frac{x^3 e^{-ax}}{a} - \frac{3x^2 e^{-ax}}{a^2} - \frac{6x\,e^{-ax}}{a^3} - \frac{6\,e^{-ax}}{a^4} \qquad \int_0^\infty x^3 e^{-ax}\,dx = 6/a^4$$

Trigonometric Functions

$$\int \cos x\,dx = \sin x \qquad \int_0^\pi \cos x\,dx = 0$$

$$\int \sin x\,dx = -\cos x \qquad \int_0^\pi \sin x\,dx = 2$$