

List of possibly useful integrals

$$\int \sin(ax)dx = -(1/a)\cos(ax)$$

$$\int \cos(ax)dx = (1/a)\sin(ax)$$

$$\int \sin^2(ax)dx = \frac{1}{2}x - (1/4a)\sin(2ax)$$

$$\int \cos^2(ax)dx = \frac{1}{2}x + (1/4a)\sin(2ax)$$

$$\int \sin(ax)\sin(bx)dx = [1/2(a-b)]\sin[(a-b)x] - [1/2(a+b)]\sin[(a+b)x], \quad a^2 \neq b^2$$

$$\int \cos(ax)\cos(bx)dx = [1/2(a-b)]\sin[(a-b)x] + [1/2(a+b)]\sin[(a+b)x], \quad a^2 \neq b^2$$

$$\int x \sin(ax)dx = (1/a^2)\sin(ax) - (x/a)\cos(ax)$$

$$\int x \cos(ax)dx = (1/a^2)\cos(ax) + (x/a)\sin(ax)$$

$$\int x^2 \cos(ax)dx = [(a^2x^2 - 2)/a^3]\sin(ax) + 2x\cos(ax)/a^2$$

$$\int x^2 \sin(ax)dx = -[(a^2x^2 - 2)/a^3]\cos(ax) + 2x\sin(ax)/a^2$$

$$\int x \sin^2(ax)dx = x^2/4 - x\sin(2ax)/4a - \cos(2ax)/8a^2$$

$$\int x^2 \sin^2(ax)dx = x^3/6 - [x^2/4a - 1/8a^3]\sin(2ax) - x\cos(2ax)/4a^2$$

$$\int x \cos^2(ax)dx = x^2/4 + x\sin(2ax)/4a + \cos(2ax)/8a^2$$

$$\int x^2 \cos^2(ax)dx = x^3/6 + [x^2/4a - 1/8a^3]\sin(2ax) + x\cos(2ax)/4a^2$$

$$\int x \exp(ax)dx = \exp(ax) (ax-1)/a^2$$

$$\int x \exp(-ax)dx = \exp(-ax) (-ax-1)/a^2$$

$$\int x^2 \exp(ax)dx = \exp(ax) [x^2/a - 2x/a^2 + 2/a^3]$$

$$\int x^m \exp(ax)dx = \exp(ax) \sum_{r=0}^m (-1)^r m!x^{m-r}/(m-r)!a^{r+1}$$

$$\int_0^\infty x^n \exp(-ax)dx = n!/a^{n+1} \quad a > 0, n \text{ positive integer}$$

$$\int_0^\infty x^2 \exp(-ax^2)dx = (1/4a)(\pi/a)^{1/2} \quad a > 0$$

$$\int_0^\infty x^{2n} \exp(-ax^2)dx = (1 \cdot 3 \cdot 5 \cdot \dots \cdot (2n-1))/(2^{n+1}a^n)(\pi/a)^{1/2} \quad a > 0$$

$$\int_0^\infty x^{2n+1} \exp(-ax^2)dx = n!/2a^{n+1} \quad a > 0, n \text{ positive integer}$$

$$\int_0^\infty \exp(-a^2x^2)dx = (1/2a)(\pi)^{1/2} \quad a > 0$$

$$\int_0^\infty \exp(-ax) \cos(bx)dx = a/(a^2+b^2) \quad a > 0$$

$$\int_0^\infty \exp(-ax) \sin(bx)dx = b/(a^2+b^2) \quad a > 0$$

$$\int_0^\infty x \exp(-ax) \sin(bx)dx = 2ab/(a^2+b^2)^2 \quad a > 0$$

$$\int_0^\infty x \exp(-ax) \cos(bx)dx = (a^2-b^2)/(a^2+b^2)^2 \quad a > 0$$

$$\int_0^\infty \exp(-a^2x^2) \cos(bx)dx = [(\pi)^{1/2}/2a] \cdot \exp[-b^2/4a^2] \quad ab \neq 0$$