Simple Mathematik (Wiederholung von Bekanntem)

Differnzieren

$$d/dx(ax^{\alpha}) = a\alpha x^{\alpha-1}$$

$$d/dt\ \sin(at) = a\cos(at)$$
$$d/dt\ \cos(at) = -a\sin(at)$$
$$d/dx\ e^{\alpha x} = \alpha\, e^{\alpha x}$$
$$d/dr\ \ln(r) = 1/r$$

Integrieren

$$\int ax^{\alpha}\, dx = a/(\alpha+1)\, x^{\alpha+1}$$

$$\int \sin(at)dt = -1/a\cos(at) + const$$
$$\int \cos(at)dt = 1/a\sin(at) + const$$
$$\int e\alpha x\, dx = 1/\alpha\, e^{\alpha x}$$
$$\int 1/r\, dr = \ln(r) + const$$

Kettenregel:

$$d/dx[\,F(g(x))] = dF(g(x))/dg(x) * dg(x)/dx$$

Beisp.: $d/dx(a^2+x^2)^{-3/2} = -2/3\,(a^2+x^2)^{-1/2} * 2x$

Spezielle Funktionen:

$$\sin^2 x+\cos^2 x = 1 \qquad \cos(x) = \sin(x + \pi/2)$$
$$a\sin(x) + b\cos(x) = A\sin(x+\varphi)\ ;\ A=\sqrt{(a^2+b^2)}\ ,\ \tan\varphi = b/a$$
$$e^{\ln(x)} = x$$

Reihenentwicklungen:

$$\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots$$
$$\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! + \ldots$$
$$e^x = 1 + x + x^2/2! + x^3/3! + x^4/4! + \ldots$$

Binominalentwicklung:

$$(1\pm x)m = 1 \pm mx + m(m-1)/2!\, x^2 \pm m(m-1)(m-2)/3!\, x^3 + ..$$

Taylorreihe (Entwicklung von f(x) in der Umgebung von x_0)

$$f(x-x_0) = f(x_0) + df/dx|_{x0}\,(x-x_0) + d^2f/dx^2|_{x0}\,(x-x_0)^2/2!$$
$$+ d^3f/dx^3|_{x0}\,(x-x_0)^3/3! + \ldots$$