Sviluppi MacLaurin:

e^x: $1 + \frac{x^2}{2} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots \to \sum_{k=0}^{n} \frac{x^k}{k!}$

$\ln(1+x)$: $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots \to \sum_{k=0}^{n} (-1)^k \frac{x^k}{k}$

$\sin(x)$: $x - \frac{x^3}{3!} + \frac{x^5}{5!} + \ldots \to \sum_{k=0}^{n} (-1)^k \frac{x^{1+2k}}{(1+2k)!}$

$\cos(x)$: $1 - \frac{x^2}{2} + \frac{x^4}{4!} - \frac{x^6}{6!} \to \sum_{k=0}^{n} (-1)^k \frac{x^{2k}}{(2k)!}$

$\sinh(x)$: $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \ldots \to \sum_{k=0}^{n} \frac{x^{1+2k}}{(1+2k)!}$

$\cosh(x)$: $1 + \frac{x^2}{2} + \frac{x^4}{4!} + \ldots \to \sum_{k=0}^{n} \frac{x^{2k}}{(1+2k)!}$

$\tan(x)$: $x + \frac{x^3}{3} + \frac{2}{15} x^5 + o(x^6)$

$(1+x)^\alpha$: $\sum_{k=0}^{n} \binom{\alpha}{n} x^n$ con $\binom{\alpha}{n} = \frac{\alpha(\alpha-1)(\alpha-2)\ldots(\alpha-n+1)}{n!}$

Formule goniometriche

$\sin(\alpha \pm \beta) = \sin\alpha \cos\beta \pm \cos\alpha \sin\beta$ $\quad$ $\sin(2\alpha) = 2 \sin\alpha \cos\alpha$

$\cos(\alpha \pm \beta) = \cos\alpha \cos\beta \mp \sin\alpha \sin\beta$ $\quad$ $\cos(2\alpha) = \cos^2\alpha - \sin^2\alpha \to 1 - 2\sin^2\alpha \,;\, 2\cos^2\alpha - 1$

$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 + \tan\alpha \tan\beta}$ $\quad$ $\tan(2a) = \frac{2\tan\alpha}{1+\tan^2\alpha}$

$\sin\left(\frac{\alpha}{2}\right) = \sqrt{\frac{1-\cos\alpha}{2}}$

$\cos\left(\frac{\alpha}{2}\right) = \sqrt{\frac{1+\cos\alpha}{2}}$

$\sin\alpha = \frac{2t}{1+t^2}$ $\quad$ $\cos\alpha = \frac{1-t^2}{1+t^2}$ $\quad$ con $t = \tan\frac{\alpha}{2}$

Funzioni iperboliche

$\sinh x = \frac{e^x - e^{-x}}{2}$ $\quad$ $\cosh x = \frac{e^x + e^{-x}}{2}$

$\frac{d}{dx} \sinh x = \cosh x$ $\quad$ $\frac{d}{dx} \cosh x = \sinh x$

$\operatorname{asinh} x = \ln(1 + \sqrt{1+x^2})$ $\quad$ $\operatorname{acosh} x = \ln(1 + \sqrt{x^2-1})$

$\sinh(\operatorname{acosh} x) = \sqrt{x^2-1}$ $\quad$ $\cosh(\operatorname{asinh} x) = \sqrt{x^2+1}$

$\cosh^2 x - \sinh^2 x = 1$

$\sinh 2x = 2 \sinh x \cosh x$ $\quad$ $\cosh 2x = \cosh^2 x + \sinh^2 x$

$\sinh \frac{x}{2} = \sqrt{\frac{\cosh x - 1}{2}}$ $\quad$ $\cosh \frac{x}{2} = \sqrt{\frac{1+\cosh x}{2}}$

Sostituzioni integrali

$\sqrt{a^2 - x^2} \to x = a \sin t$

$\sqrt{x^2 - a^2} \to x = a \cosh t$

$\sqrt{a^2 + x^2} \to x = a \sinh t$

$R(x, x^{n_1/m_1}, \ldots) \to x = t^n$ con n minimo comune multiplo di $m_1, m_2 \ldots$

Asintotici

$\sin x \sim x$ $\quad$ $\sinh x \sim x$

$1 - \cos x \sim \frac{1}{2} x^2$ $\quad$ $\cosh x - 1 \sim \frac{1}{2} x^2$

$\tan x \sim x$

$\arctan x \sim x$

$e^x - 1 \sim x$ $\quad$ $a^x - 1 \sim x \ln a$

$\ln(1+x) \sim x$ $\quad$ $\log_a(1+x) \sim x \log_a e$

$(1+x)^k - 1 \sim kx$

$x \to 0$

$\ln(x) \sim x - 1$ $\quad$ $x \to 1$

Numeri complessi

$\sqrt[n]{z} = \sqrt[n]{|z|} \left(\cos\left(\frac{\alpha + 2k\pi}{n}\right) + i \sin\left(\frac{\alpha + 2k\pi}{n}\right) \right)$

$z^n = |z|^n \left(\cos(n\alpha) + i \sin(n\alpha) \right)$

$z + \bar{z} = 2\,\mathrm{Re}(z)$ $\quad$ $z - \bar{z} = 2\,\mathrm{Im}(z)\, i$

$z \bar{z} = |z|^2$ $\quad$ $\frac{z}{\bar{z}} = \frac{z^2}{|z|^2}$