1 Sviluppi taylor in 0

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \qquad \log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$$

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \qquad \cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} \dots$$

$$\sinh(x) = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} \dots \qquad \cosh(x) = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$$

$$\arctan(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} \dots$$

$$(1+x)^\alpha = 1 + \alpha x + \frac{\alpha(\alpha-1)}{2}x^2 + \dots + \binom{\alpha}{n}x^n + \dots$$

2 Limiti notevoli

$$\lim_{x\to 0} \frac{\sin(x)}{x} = 1$$

$$\lim_{x\to +\infty} \left(1 + \frac{1}{x}\right)^x = e$$

$$\lim_{x\to 0} \frac{1-\cos(x)}{x^2} = \frac{1}{2} \qquad \lim_{x\to 0} \frac{e^x - 1}{x} = 1$$

$$\lim_{x\to 0} \frac{\log(1+x)}{x} = 1 \qquad \lim_{x\to \infty} \left(1 + \frac{1}{x}\right)^x = e$$

$$\lim_{x\to 0} \frac{\tan(x)}{x} = 1 \qquad \lim_{x\to 0} \frac{\arctan(x)}{x} = 1$$

$$\lim_{x\to 0} \frac{\arcsin(x)}{x} = 1 \qquad \lim_{x\to 0} \frac{a^x - 1}{x} = \log(a)$$

$$\lim_{x\to 0^+} x\log(x) = 0$$

3 Proprietà fattoriali

- Scontate:

$$\binom{n}{0} = \frac{n!}{0!n!} = 1 \qquad \binom{n}{n} = \frac{n!}{n!0!} = 1$$

$$\binom{n}{1} = \frac{n!}{1!(n-1)!} = \frac{n(n-1)!}{(n-1)} = n \qquad \binom{n}{n-1} = \frac{n!}{(n-1)1!} = \frac{n(n-1)!}{(n-1)!} = n$$

- Simmetrica:

$$\binom{n}{k} = \binom{n}{n-k}$$

- Generazione ricorsiva binomiale:

$$\binom{n+1}{k+1} = \binom{n}{k} + \binom{n}{k+1}$$

4 Derivate elementari

$$(\tan x)' = \frac{1}{\cos^2 x} = 1 + (\tan x)^2 \qquad (\arctan)' = \frac{1}{1+x^2}$$
$$(\arcsin)' = \frac{1}{\sqrt{1-x^2}} \qquad (\arccos)' = -\frac{1}{\sqrt{1-x^2}}$$
$$(a^x)' = a^x \cdot \log a \qquad (\log_a(x))' = \frac{1}{x \ln(a)}$$

5 Formule di trigonometriche

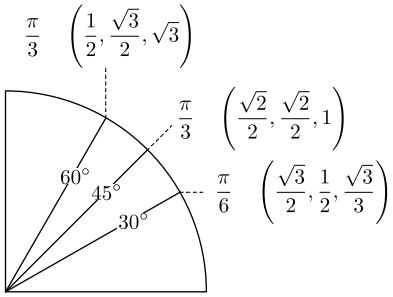
$$\sin(\alpha+\beta) = \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta)$$
$$\sin(\alpha-\beta) = \sin(\alpha)\cos(\beta) - \cos(\alpha)\sin(\beta)$$
$$\cos(\alpha+\beta) = \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta)$$
$$\cos(\alpha-\beta) = \cos(\alpha)\cos(\beta) + \sin(\alpha)\sin(\beta)$$

6 Formule iperboliche

$$\cosh = \frac{e^x + e^{-x}}{2} \to pari$$
$$\sinh = \frac{e^x - e^{-x}}{2} \to dispari$$
$$\tanh = \frac{\sinh}{\cosh} \to dispari$$

$$\sinh(2\alpha) = 2\sinh(\alpha)\cosh(\alpha)$$
$$\cosh(2\alpha) = \cosh^2(\alpha) + \sinh^2(\alpha)$$
$$\sinh(\alpha+\beta) = \sinh(\alpha)\cosh(\beta) + \sinh(\beta)\cosh(\alpha)$$
$$\cosh(\alpha+\beta) = \cosh(\alpha)\cosh(\beta) + \sinh(\alpha)\sinh(\beta)$$

7 Angoli noti



8 Altro

$$\sum_{k=0}^{n} k = \frac{n(n+1)}{2} \qquad \sum_{k=0}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$$
$$\sum_{k=0}^{n} a^k = \frac{a^{n+1}-1}{a-1} \qquad 2^n \geq n$$

$$(1+x)^n \geq 1 + nx$$