

# INTEGRALI

- 1)  $\int x^p dx = \frac{x^{p+1}}{p+1} + c \quad (p \in \mathbb{R}, \quad p \neq -1)$
- 2)  $\int \frac{1}{x} dx = \ln|x| + c$
- 3)  $\int a^x dx = \frac{a^x}{\ln a} + c$
- 4)  $\int e^x dx = e^x + c$
- 5)  $\int \sin x dx = -\cos x + c$
- 6)  $\int \cos x dx = \sin x + c$
- 7)  $\int \frac{1}{\cos^2 x} dx = \tan x + c$
- 8)  $\int \frac{1}{\sin^2 x} dx = -\cot x + c$
- 9)  $\int \frac{1}{1+x^2} dx = \arctan x + c$
- 10)  $\int \frac{1}{\sqrt{1-x^2}} dx = \arcsin x + c$
- 11)  $\int \sinh x dx = \cosh x + c$
- 12)  $\int \cosh x dx = \sinh x + c$
- 13)  $\int \frac{1}{\sqrt{1+x^2}} dx = \operatorname{settsinh} x + c = \ln(x + \sqrt{1+x^2}) + c$
- 14)  $\int \frac{1}{\sqrt{x^2-1}} dx = \ln|x + \sqrt{x^2-1}| + c$

# DERIVATE

- 1)  $D(x^p) = px^{p-1} \quad (p \in \mathbb{R})$
- 2)  $D(a^x) = a^x \ln a$
- 3)  $D(e^x) = e^x$
- 4)  $D(\log_a x) = \frac{1}{x} \log_a e$
- 5)  $D(\ln x) = \frac{1}{x}$
- 6)  $D(\sin x) = \cos x$
- 7)  $D(\cos x) = -\sin x$
- 8)  $D(\tan x) = \frac{1}{\cos^2 x} = 1 + \tan^2 x$
- 9)  $D(\cot x) = -\frac{1}{\sin^2 x} = -1 - \cot^2 x$
- 10)  $D(\arcsin x) = \frac{1}{\sqrt{1-x^2}}$
- 11)  $D(\arccos x) = -\frac{1}{\sqrt{1-x^2}}$
- 12)  $D(\arctan x) = \frac{1}{1+x^2}$
- 13)  $D(\sinh x) = \cosh x$
- 14)  $D(\cosh x) = \sinh x$
- 15)  $D(\operatorname{settsinh} x) = \frac{1}{\sqrt{1+x^2}}$
- 16)  $D(\operatorname{settcosh} x) = \frac{1}{\sqrt{x^2-1}}$

# SVILUPPI DI McLAURIN

- 1)  $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!} + o(x^n)$
- 2)  $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} + \dots + (-1)^{n-1} \frac{x^n}{n} + o(x^n)$
- 3)  $\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} + \dots + (-1)^n \frac{x^{2n+1}}{(2n+1)!} + o(x^{2n+2})$
- 4)  $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + \dots + (-1)^n \frac{x^{2n}}{(2n)!} + o(x^{2n+1})$
- 5)  $\tan x = x + \frac{x^3}{3} + \frac{2x^5}{15} + o(x^6)$
- 6)  $\arcsin x = x + \frac{x^3}{6} + \frac{3x^5}{40} + o(x^6)$
- 7)  $\arccos x = \frac{\pi}{2} - \arcsin x$
- 8)  $\arctan x = x - \frac{x^3}{3} + \frac{x^5}{5} + \dots + (-1)^n \frac{x^{2n+1}}{2n+1} + o(x^{2n+2})$
- 9)  $\sinh x = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \dots + \frac{x^{2n+1}}{(2n+1)!} + o(x^{2n+2})$
- 10)  $\cosh x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots + \frac{x^{2n}}{(2n)!} + o(x^{2n+1})$
- 11)  $(1+x)^\alpha = 1 + \alpha x + \frac{\alpha(\alpha-1)}{2!} x^2 + \frac{\alpha(\alpha-1)(\alpha-2)}{3!} x^3 + \dots + \binom{\alpha}{n} x^n + o(x^n)$
- 11a)  $\frac{1}{1+x} = 1 - x + x^2 - x^3 + \dots + (-1)^n x^n + o(x^n)$
- 11b)  $\frac{1}{\sqrt{1+x}} = 1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16} + \frac{35x^4}{128} + o(x^4)$
- 11c)  $\sqrt{1+x} = 1 + \frac{x}{2} - \frac{x^2}{8} + \frac{x^3}{16} - \frac{5x^4}{128} + o(x^4)$

# TRIGONOMETRIA

- 1)  $\sin(p + q) = \sin p \cos q + \cos p \sin q$
- 2)  $\sin(p - q) = \sin p \cos q - \cos p \sin q$
- 3)  $\cos(p + q) = \cos p \cos q - \sin p \sin q$
- 4)  $\cos(p - q) = \cos p \cos q + \sin p \sin q$
- 5)  $\sin(2p) = 2 \sin p \cos p$
- 6)  $\cos(2p) = \cos^2 p - \sin^2 p$
- 7)  $\sin \frac{p}{2} = \pm \sqrt{\frac{1 - \cos p}{2}}$
- 8)  $\cos \frac{p}{2} = \pm \sqrt{\frac{1 + \cos p}{2}}$
- 9)  $\sin p \cos q = \frac{1}{2} [\sin(p + q) + \sin(p - q)]$
- 10)  $\sin p \sin q = \frac{1}{2} [\cos(p - q) - \cos(p + q)]$
- 11)  $\cos p \cos q = \frac{1}{2} [\cos(p - q) + \cos(p + q)]$
- 12)  $\sin p + \sin q = 2 \sin \frac{p+q}{2} \cos \frac{p-q}{2}$
- 13)  $\sin p - \sin q = 2 \cos \frac{p+q}{2} \sin \frac{p-q}{2}$
- 14)  $\cos p + \cos q = 2 \cos \frac{p+q}{2} \cos \frac{p-q}{2}$
- 15)  $\cos p - \cos q = -2 \sin \frac{p+q}{2} \sin \frac{p-q}{2}$  .

## Formule parametriche

Posto  $t = \tan \frac{x}{2}$  :

- 1)  $\sin x = \frac{2t}{1+t^2}$
- 2)  $\cos x = \frac{1-t^2}{1+t^2}$
- 3)  $\tan x = \frac{2t}{1-t^2}$

# FUNZIONI IPERBOLICHE

## Relazioni fondamentali

$$1) \sinh x := \frac{e^x - e^{-x}}{2}$$

$$2) \cosh x := \frac{e^x + e^{-x}}{2}$$

$$3) \tanh x := \frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{e^{2x} - 1}{e^{2x} + 1} = \frac{1 - e^{-2x}}{1 + e^{-2x}}$$

$$4) \cosh^2 x - \sinh^2 x = 1$$

$$5) \cosh 2x = \cosh^2 x + \sinh^2 x$$

$$6) \sinh 2x = 2 \sinh x \cosh x$$