INTEGRALI

INTEGRALE DEFINITO

- $\int_a^b f(x)dx = \begin{cases} \int_{[a,b]} f(x)dx & \text{se a < b} \\ 0 & \text{se a = b} \\ -\int_{[b,a]} f(x)dx & \text{se a > b} \end{cases}$
- $\int_a^b f(x)dx = -\int_b^a f(x)dx$
- $\int_a^b \left(c_1 f(x) + c_2 g(x)\right)dx = c_1 \int_a^b f(x)dx + c_2 \int_a^b g(x)dx$
- $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$
- $F(x) = \int_{x_0}^x f(t)dt \quad \Rightarrow \qquad F'(x) = f(x)$
- $\int_a^b f(x)dx = F(b) - F(a)$

INTEGRALE INDEFINITO

- $\int f(x)dx = F(x) + c$

METODI DI INTEGRAZIONE

- $\int kf(x)dx = k\int f(x)dx, \quad k \neq 0$
- $\int \left(f(x) + g(x)\right)dx = \int f(x)dx + \int g(x)dx$
- $\int \left(f(x) + g(x)\right)dx = F(x) + \int g(x)dx$
- $\int \left(f'(x) \cdot g(x)\right)dx = f(x)g(x) - \int \left(f(x) \cdot g'(x)\right)dx$ (Integrazione per parti)
- $\int f\left(\boldsymbol{j}(x)\right)\boldsymbol{j}'(x)dx = \left[\int f(t)dt\right]_{t=j(x)}$ dove $f : (\boldsymbol{a}, \boldsymbol{b}) \to R$, $\boldsymbol{j} : (a,b) \to (\boldsymbol{a}, \boldsymbol{b})$ (per sost.)
- $\int f(x)dx = \left[\int f(\boldsymbol{j}(t))\boldsymbol{j}'(t)dt\right]_{t=y(x)}$ dove $f : (a,b) \to R$, $\boldsymbol{j} : (\boldsymbol{a}, \boldsymbol{b}) \to (a,b)$
  e $\boldsymbol{y} : (a,b) \to (\boldsymbol{a}, \boldsymbol{b})$ (Inversa di $\boldsymbol{j}$) (per sost.)
- $\int R(y)dy \quad \Rightarrow \qquad \int \frac{R(y)}{D(y)} D(y)dy = \int R_1(y)D(y)dy = \left[\int R_1(t)\right]_{t=y}$

INTEGRALI INDEFINITI IMMEDIATI

- $\int x^a \, dx = \frac{x^{a+1}}{a+1} + c \qquad a \neq 1$
- $\int \frac{1}{x} \, dx = \log|x| + c$
- $\int e^x \, dx = e^x + c$
- $\int a^x \, dx = \frac{a^x}{\log a} + c$
- $\int \operatorname{sen} x \, dx = -\cos x + c$
- $\int \cos x \, dx = \operatorname{sen} x + c$
- $\int \frac{1}{\cos^2 x} \, dx = \tan x + c$
- $\int \frac{1}{\sqrt{1-x^2}} dx = \operatorname{arcsen} x + c = -\arccos x + c$
- $\int \frac{1}{1+x^2} dx = \operatorname{arctg} x + c$
- $\int \operatorname{senh} x \, dx = \cosh x + c$
- $\int \cosh x \, dx = \operatorname{senh} x + c$
- $\int \frac{1}{\cosh^2 x} dx = \tanh x + c$
- $\int \frac{1}{\sqrt{1+x^2}} \, dx = sett \operatorname{senh} x + c = \log\left(x + \sqrt{1+x^2}\right) + c$
- $\int \frac{1}{\sqrt{x^2-1}} \, dx = sett \cosh x + c = \log\left(x + \sqrt{x^2-1}\right) + c$ in $]1,+\infty[$

  e $\log\left|x + \sqrt{x^2-1}\right| + c$ in $]1,+\infty[$ e $]-\infty,-1[$

- $\int \frac{1}{1-x^2} \, dx = sett \tanh x + c = \frac{1}{2} \log \frac{1+x}{1-x} + c$ in $]-1,1[$

  e $\frac{1}{2} \log\left|\frac{1+x}{1-x}\right| + c$ in $]-\infty,1[,]-1,1[,]1,+\infty[$