INTEGRALI DI FUNZIONI COMPOSTE

M5034

TROVA LE DIFFERENZE !

Integrali immediati	Integrali con una funzione composta
$\int x^\alpha dx = \frac{x^{\alpha+1}}{\alpha+1} + c, \quad \text{con } \alpha \neq -1$	$\int [f(x)]^\alpha f'(x)\, dx = \frac{[f(x)]^{\alpha+1}}{\alpha+1} + c, \quad \text{con } \alpha \neq -1$
$\int \frac{1}{x} dx = \ln\lvert x \rvert + c$	$\int \frac{f'(x)}{f(x)} dx = \ln\lvert f(x) \rvert + c$
$\int e^x dx = e^x + c$	$\int f'(x)\, e^{f(x)} dx = e^{f(x)} + c$
$\int a^x dx = \frac{a^x}{\ln a} + c$	$\int f'(x)\, a^{f(x)} dx = \frac{a^{f(x)}}{\ln a} + c$
$\int \sin x\, dx = -\cos x + c$	$\int f'(x) \sin f(x)\, dx = -\cos f(x) + c$
$\int \cos x\, dx = \sin x + c$	$\int f'(x) \cos f(x)\, dx = \sin f(x) + c$
$\int \frac{1}{\cos^2 x} dx = \tan x + c$	$\int \frac{f'(x)}{\cos^2 f(x)} dx = \tan f(x) + c$
$\int \frac{1}{\sin^2 x} dx = -\cot x + c$	$\int \frac{f'(x)}{\sin^2 f(x)} dx = -\cot f(x) + c$
$\int \frac{1}{\sqrt{1-x^2}} dx = \arcsin x + c$	$\int \frac{f'(x)}{\sqrt{1-[f(x)]^2}} dx = \arcsin f(x) + c$
$\int \frac{1}{1+x^2} dx = \arctan x + c$	$\int \frac{f'(x)}{1+[f(x)]^2} dx = \arctan f(x) + c$

SE ANZICHÉ "x" HAI $f(x)$ → ALLORA DEVI AVERE ANCHE $f'(x)$

ESEMPI:

- $\int 2x\,(x^2-1)^3\,dx = \frac{1}{4}(x^2-1)^4 + c$

- $\int x\sqrt{1-x^2}\,dx = \int x\,(1-x^2)^{\frac{1}{2}}\,dx = \frac{1}{-2}\int -2x\,(1-x^2)^{\frac{1}{2}}\,dx$

$$= -\frac{1}{2}\,\frac{1}{\left(\frac{1}{2}+1\right)}\,(1-x^2)^{\frac{1}{2}+1} + c = -\frac{1}{3}\sqrt{(1-x^2)^3} + c$$

- $\int \frac{\ln x}{x}\,dx = \int \frac{1}{x}\,\ln^1 x + c = \frac{(\ln x)^2}{2} + c$

- $\int \frac{(\arcsin^4 x)}{\sqrt{1-x^2}}\,dx = \int \frac{1}{\sqrt{1-x^2}}\,(\arcsin x)^4\,dx$

$$\frac{(\arcsin x)^5}{5} + C$$

- $$\int \frac{x^2}{x^3+2}\,dx = \int ? \cdot \frac{1}{x^3+2}\,dx = \int \frac{3}{3} x^2 \cdot \frac{1}{x^3+2}\,dx$$

$$= \frac{1}{3}\int 3x^2 \cdot \frac{1}{x^3+2}\,dx = \frac{1}{3}\ln|x^3+2| + C$$

c) $$\int \frac{4x+2}{x^2+x}\,dx = \int \frac{2(2x+1)}{x^2+x}\,dx = 2\ln|x^2+x| + C$$

•) $\int \frac{9x-3}{x^2+1}\,dx = \int \frac{9x}{x^2+1}\,dx - 3\int \frac{1}{x^2+1}\,dx =$

$= \frac{9}{2}\int \frac{2x}{x^2+1}\,dx - 3\arctan x + C =$

$= \frac{9}{2}\ln(x^2+1) - 3\arctan x + C$