

INTEGRALI

EX Calcolare i seguenti integrali indefiniti:

$$\begin{aligned} & \int \lg x dx, \int x(x^2+1)^k dx \quad (k \in \mathbb{N}), \int \frac{\sin \sqrt{x}}{\sqrt{x}} dx, \int \frac{x}{\sqrt{2-3x}} dx, \int x e^{x^2} dx, \int \sqrt{1-x^2} dx, \\ & \int x^2 e^x dx, \int x^2 \cos x dx, \int \sin x \cos x dx, \int \sin^2 x dx, \int \lg x dx, \int x a^{-x} dx, \int \sqrt{x-1} dx \\ & \int \sin x e^{-x} dx, \int \frac{\lg(\lg x)}{x} dx, \int \frac{dx}{x \sqrt{2x-1}}, \int \frac{x}{\sqrt{1-x^2}} dx, \int \frac{dx}{a^2-x^2}, \int \frac{dx}{\sqrt{a^2-x^2}}, \\ & \int \frac{dx}{\sin^2 x \cos^2 x}, \int \frac{x^3+2}{x^2+2} dx, \int \frac{dx}{x^3-1}, \int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x} dx, \int \frac{1}{\sin x} dx, \\ & \int \frac{dx}{\sin x + \cos x}, \int \frac{1}{1+\sin x} dx, \int \sin^2 x \cos^2 x dx, \int \frac{e^x-1}{e^{2x}+e^x+1} dx, \int \frac{x}{1-x^4} dx, \\ & \int \frac{2x dx}{(x+1)(x-2)(x+1)}, \int \frac{\sin(\lg x)}{x} dx, \int \frac{x^2-1}{x^2+5} dx, \int (3x+1)^{1/2} dx, \\ & \int \frac{dx}{x \sqrt{1-\lg^2 x}}, \int \frac{dx}{x^2(x^2+1)}, \int \frac{\sqrt{x}}{\sqrt{x}+1} dx, \int \frac{x}{(1+x^2)^2} dx, \int \frac{x^3}{x^3-1} dx, \\ & \int x(x+\frac{1}{4})^{1/2} dx, \int \frac{dx}{(1+e^x)^{1/2}}, \int \frac{dx}{1+\cos^2 x}, \int x^3 \sqrt{x^2+1} dx, \int \frac{x-3}{(x^2-6x+9)^2} dx \end{aligned}$$

EX Calcolare i seguenti integrali definiti

$$\begin{aligned} & \int_0^2 |2t^2-3| dt, \int_{-\pi/4}^{\pi/4} \frac{\sin x}{\cos x} dx, \int_0^1 \frac{x}{1+x^2} dx, \int_{-1}^1 (x+|x|) dx, \int_{-1}^1 \frac{x^2+x+1}{x^2-x+1} dx, \\ & \int_1^2 \frac{dx}{\sqrt{x}-\sqrt[4]{x}}, \int_2^3 \frac{x+3}{e^x} dx, \int_1^{e^{\pi}+1} \sin^2(2x+2) dx, \int_{-1}^1 \frac{x^3}{2-x^2} dx, \int_1^2 \frac{\sqrt{x+1}}{\sqrt{x^2+x}} dx, \\ & \int_0^1 \frac{x^2}{\sqrt[3]{1+2x}} dx, \int_{-1}^3 (x^3+x) e^{x^2} dx. \end{aligned}$$

EX Calcolare i seguenti integrali impropri (se esistono e se "possibile")

$$\begin{aligned} & \int_{-\pi}^{+\infty} \frac{x}{e^x+1} dx, \int_0^{+\infty} \frac{1}{\sin x} dx, \int_0^1 \frac{dx}{x^2-x+1}, \int_1^{+\infty} \frac{1}{x^2+x+1} dx, \int_2^{+\infty} \frac{dx}{\sqrt{x+20}}, \\ & \int_0^{+\infty} \frac{\sqrt{x+1}}{\sqrt{x^3+x}} dx, \int_{-\pi/2}^{\pi/2} \frac{\sin x}{\sqrt[3]{x}} dx, \int_0^1 \frac{x dx}{1-\cos x}, \int_0^1 \frac{dx}{\sqrt{\lg x-x}}, \int_0^{+\infty} \frac{x^\alpha}{(x-1)^\alpha} dx, \alpha \neq 0 \\ & \int_{-\pi/2}^{\pi/2} \lg x dx, \int_0^{1/2} \frac{\lg 2x}{2x-1} dx, \int_{-\infty}^{+\infty} \frac{dx}{x^2}, \int_{-\infty}^{+\infty} e^{-x^2} dx, \int_0^1 \frac{dx}{(x-\operatorname{arctg} x)^2}, \int_0^1 \frac{dx}{(1-e^x)^\alpha}, \alpha > 0 \\ & \int_0^{+\infty} \frac{x^\alpha}{\lg x} dx, \int_0^1 e^{-\frac{1}{x^2}} \lg x dx, \int_0^{+\infty} e^{-\frac{1}{x}} \lg x dx. \end{aligned}$$