

Integrali definiti

Calcolare i seguenti integrali definiti:

$$1. \int_{\ln^2 2}^4 \frac{e^{\sqrt{x}}}{2\sqrt{x}} dx; \quad [e^2 - 2]$$

$$2. \int_0^{\frac{\pi}{2}} \frac{\sin x}{2 + \cos^2 x} dx; \quad \left[\frac{1}{\sqrt{2}} \arctan \frac{1}{\sqrt{2}} \right]$$

$$3. \int_0^{\frac{\pi}{4}} \frac{\cos x}{\sin^2 x + \frac{1}{2}} dx; \quad \left[\frac{\pi}{2\sqrt{2}} \right]$$

$$4. \int_0^{\frac{\pi}{4}} \frac{2 + \tan^2 x}{(1 + x + \tan x)^3} dx; \quad \left[\frac{\pi^2 + 16\pi + 48}{2(8 + \pi)^2} \right]$$

$$5. \int_1^{e^3} \frac{1}{x\sqrt{1 + \ln x}} dx; \quad [2]$$

$$6. \int_{\sqrt{e}}^{e^2} \frac{1}{x \ln^4 x} dx; \quad \left[\frac{21}{8} \right]$$

$$7. \int_1^{e^4} \frac{e^{\sqrt{\ln x}}}{x\sqrt{\ln x}} dx; \quad [2(e^2 - 1)]$$

$$8. \int_{\frac{1}{2}}^1 \frac{\arcsin^2 x}{\sqrt{1 - x^2}} dx; \quad \left[\frac{\pi^3}{3} \left(\frac{1}{2^3} - \frac{1}{6^3} \right) \right]$$

$$9. \int_1^2 \frac{1}{x\sqrt{1 - \ln^2 x}} dx; \quad [\arcsin(\ln 2)]$$

$$10. \int_0^{\ln 2} \sqrt[4]{(e^x + 1)^3} e^x dx; \quad \left[\frac{4}{7} \left(3^{\frac{7}{4}} - 2^{\frac{7}{4}} \right) \right]$$

$$11. \int_1^2 \frac{1 + x^2}{x + 1} dx; \quad \left[\frac{1}{2} + 2 \ln \frac{3}{2} \right]$$

$$12. \int_1^2 \frac{x}{(x + 1)(2x + 1)} dx; \quad \left[\ln \frac{9}{10} \right]$$

$$13. \int_1^2 \frac{1}{x^3 + 3x^2 + 2x} dx; \quad \left[\frac{3}{2} \ln \frac{2}{3} \right]$$

14. $\int_{\frac{1}{2}}^1 \frac{x^2 + 2x + 2}{x(x+1)(x+2)} dx;$ $\left[\ln \frac{9}{5} \right]$
15. $\int_{-1}^{-\frac{1}{2}} \frac{x+1}{x^2(x-1)^2} dx;$ $\left[\frac{4}{3} + 3 \ln \frac{2}{3} \right]$
16. $\int_0^1 \frac{4-3x}{(x-3)^2(x^2+1)} dx;$ $\left[\frac{\pi}{8} - \frac{1}{12} \right]$
17. $\int_1^2 \frac{x^3+1}{(x+x^2)(1+x^2)} dx;$ $\left[\ln 2 - \arctan 2 + \frac{\pi}{4} \right]$
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18. $\int_0^2 |x(e^x - e)| dx;$ $[e^2 - e - 1]$
19. $\int_0^{\frac{\pi}{2}} e^{2x} \cos x dx;$ $\left[\frac{e^\pi - 2}{5} \right]$
20. $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} x \sin^2 x dx;$ $\left[\frac{3}{64} \pi^2 + \frac{1}{16} \pi + \frac{1}{8} \right]$
21. $\int_0^2 e^{2x} x dx;$ $\left[\frac{1}{4} (3e^4 + 1) \right]$
22. $\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \frac{x}{\cos^2 x} dx;$ $\left[\frac{3\sqrt{3}-2}{12\sqrt{3}} \pi + \frac{1}{2} \ln \frac{2}{3} \right]$
23. $\int_1^e \ln^2 x dx;$ $[e - 2]$
24. $\int_1^2 x^3 \ln x dx;$ $\left[\ln 16 - \frac{15}{16} \right]$
25. $\int_e^{e^e} \frac{\ln(\ln x)}{x} dx;$ $[1]$
26. $\int_1^{\frac{1}{\sqrt{2}}} \frac{\sqrt{1-x^2}}{x^2} dx;$ $\left[\frac{\pi}{4} - 1 \right]$
27. $\int_0^{\frac{\pi}{6}} \cos x \sin(2x) dx.$ $\left[\frac{2}{3} - \frac{\sqrt{3}}{4} \right]$