

Università degli Studi di Roma Tre
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Corso di Laurea Triennale in Fisica e
Matematica
AM110 - Analisi Matematica I

Docente: Luca Battaglia
Esercitatrice: Michela Procesi
Tutori: Francesco Caristo, Leonardo Loepp

Tutorato 8

Esercizio 1. Calcolare i seguenti integrali definiti.

1. $\int_0^1 \left(\frac{2}{3}\right)^x dx$
2. $\int_0^2 \frac{2x^2 - 1}{2 + 3x + x^2} dx$
3. $\int_{e^e}^{e^{e^2}} \frac{1}{x(\log x)(\log^3(\log x))} dx$
4. $\int_{-\frac{1}{2}}^{\frac{1}{2}} x^2 \arctan(|2x|) dx$
5. $\int_0^3 |x^2 - 3x + 1| dx$
6. $\frac{1}{\pi} \int_{-\pi}^{\pi} \sin(nx) \sin(mx) dx \quad \text{con } n, m \in \mathbb{Z}$
7. $\int_0^{\pi} \frac{3 \cos(x) \sin(x) + 4 \sin(x)}{\sin^2(x) + 2 \cos^2(x) - \cos(x)} dx$
8. $\int_0^1 \frac{e^{2x}}{4e^{2x} + 4e^x + 1} dx$

9. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin^2(x)}{\cos^6(x)} dx$
10. $\int_1^4 \frac{8x}{1+3x^2} [x] \log(\log(3x^2+1)) dx$
11. $\int_{-1}^1 (e^{|x|} - 7|x| + \log|x|) \arctan(x) \cos(x) dx$
12. $\int_{-\frac{1}{2}}^2 \max\left\{\frac{x}{1+x}, 2x-1\right\} \log(x+1) dx$
13. $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \sin(x) \log(\sin(x)) dx$
14. $\int_0^{\pi/2} \frac{1}{8+4\sin x+7\cos x} dx$
15. $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos^2(x) + 2\sin(x)\cos(x) + 2\sin(x)}$

Esercizio 2. Calcolare i seguenti integrali indefiniti:

1. $\int \frac{1}{x\sqrt{x+4}} dx$
2. $\int \frac{x}{\cos^2(x)} dx$
3. $\int \frac{x^2}{\sqrt{9+x^2}} dx$
4. $\int \frac{\sin(x)e^{\cos(x)}}{e^{\cos^2(\frac{x}{2})} - \sin^2(\frac{x}{2}) + 1} dx$
5. $\int \frac{2x \log^2(\arctan(x^2))}{1+x^4} dx$
6. $\int \frac{3x^2}{\cosh^4(x)} dx$
7. $\int \sqrt{\tan x} dx$
8. $\int \frac{67x^{\frac{1}{\log(x)}}}{x + \sqrt{3x^2 + 5x + 7}} dx$
9. $\int x \arcsin x dx$

$$10. \int \left(\frac{x^4}{1+x^6} \right)^2 dx$$

$$11. \int \sqrt{1+\cos^2(x)} \sin(2x) \cos(2x) dx$$

$$12. \int \log(x^4 + 5x^3 + 11x^2 + 11x + 4) dx$$

$$13. \int \frac{2e^{2x} - e^x}{\sqrt{3e^{2x} - 6e^x - 1}} dx$$

$$14. \int \frac{1}{\sqrt{25x^2 + 2}} dx$$

$$15. \int \frac{\tan^3(\log x)}{x} dx$$