

Tutorato di AM120

A.A. 2012-2013 - Docente: Prof. G.Mancini

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1. Svolgere i seguenti integrali definiti:

(a) $\int_1^3 x-2 dx$	(e) $\int_0^3 \frac{x}{\sqrt{x+1}} dx$
(b) $\int_1^2 \frac{\log x}{x} dx$	(f) $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$
(c) $\int_0^{2\pi} \sin x dx$	(g) $\int_1^e \frac{1}{x\sqrt{1-\log^2 x}} dx$
(d) $\int_2^3 \log(x^2-x) dx$	

2. Risolvere i seguenti integrali tramite la sostituzione indicata:

(a) $\int \frac{1}{\sqrt{a^2-x^2}} dx$; $x = a \sin t$	(d) $\int \frac{1}{\sqrt{a^2+x^2}} dx$; $x = a \sinh t$
(b) $\int \frac{1}{\sqrt{x^2-a^2}} dx$; $x = a \cosh t$	(e) $\int \sqrt{a^2-x^2} dx$; $x = a \sin t$
(c) $\int \sqrt{a^2+x^2} dx$; $x = a \sinh t$	(f) $\int \sqrt{x^2-a^2} dx$; $x = a \cosh t$

3. Svolgere i seguenti integrali mediante la sostituzione $t = \tan\left(\frac{x}{2}\right)$:

(a) $\int \sqrt{\frac{1-\cos x}{1-\sin x}} dx$	(c) $\int \sqrt{\frac{\cos x}{1-\sin x}} dx$
(b) $\int \sqrt{\frac{1}{1-\sin x}} dx$	(d) $\int \frac{1}{(1-2\sin x)(1+\cos x)} dx$

4. Risolvere i seguenti integrali:

(a) $\int \frac{1-\sqrt[3]{x}}{\sqrt{x+\sqrt[3]{x}}} dx$	(e) $\int \frac{x}{\sqrt{-x^2+x+2}} dx$
(b) $\int \left(\frac{x}{x+1}\right)^{\frac{1}{2}} dx$	(f) $\int \sqrt{x^2+4x+13} dx$
(c) $\int \frac{1-\sqrt[3]{x+1}}{\sqrt{x+1+\sqrt[3]{x+1}}} dx$	(g) $\int \sqrt{-x^2-x+1} dx$
(d) $\int \frac{1}{\sqrt{x^2-3x+2}} dx$	(h) $\int \frac{x+3}{\sqrt{x^2+2x+10}} dx$
	(i) $\int \frac{x^3+x}{\sqrt{-x^4+3x^2-2}} dx$

5. Dimostrare che

$$\int_0^\pi \cos^{2n} x dx = \int_0^\pi \sin^{2n} x dx = \frac{(2n-1)!!}{(2n)!!} \pi.$$

6. (Malus) Calcolare: $\int_0^{2\pi} \frac{1}{1+\sin^2 x} dx$.