Universidade Federal de Santa Catarina
Centro de Ciências Físicas e Matemáticas
Departamento de Matemática

Cálculo 1 (MTM3101 e MTM3110)

Lista 4.16 - Integrais de todos os tipos

Última atualização: 22 de junho de 2022.

Exercícios Principais

P1. Calcule as integrais abaixo.

(a) $\displaystyle\int \frac{2^x}{3+2^x}\,dx.$

(b) $\displaystyle\int (1-2x^2\sec(5x^3))\,dx.$

(c) $\displaystyle\int \frac{x+2}{x^3+2x^2+5x}\,dx.$

(d) $\displaystyle\int (1-x+e^{3x}\cos(2x))\,dx.$

(e) $\displaystyle\int (x^2-2\sqrt[3]{x^2}-3x^{-1})\,dx.$

(f) $\displaystyle\int \frac{1}{4+x^2}\,dx.$

(g) $\displaystyle\int_0^{\pi/4} \cos^3 x\,dx.$

(h) $\displaystyle\int x\,\mathrm{tg}^2\,x\,dx.$

(i) $\displaystyle\int \sqrt{1-4x^2}\,dx.$

(j) $\displaystyle\int_0^1 \frac{x-4}{x^2-5x+6}\,dx.$

(k) $\displaystyle\int_0^{\pi/8} (2x-\mathrm{sen}(2x)\,\mathrm{sen}(4x))\,dx.$

(l) $\displaystyle\int \mathrm{cossec}^2\,x\sqrt{\mathrm{cotg}\,x}\,dx.$

(m) $\displaystyle\int_{-\pi/4}^0 \cos^3(2x)\,\mathrm{sen}(2x)\,dx.$

(n) $\displaystyle\int \sqrt{-x^2+2x+3}\,dx.$

(o) $\displaystyle\int \mathrm{sen}^4\,x\cos^2 x\,dx.$

(p) $\displaystyle\int_0^2 \frac{1}{\sqrt{4+x^2}}\,dx.$

(q) $\displaystyle\int \mathrm{tg}^4\,x\,dx.$

(r) $\displaystyle\int e^{\sqrt{x}}\,dx.$

(s) $\displaystyle\int \left(\sec^2(2x)+\frac{1+x}{1+x^2}\right)dx.$

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Gabarito da Lista 4.16

Integrais de todos os tipos

Última atualização: 22 de junho de 2022.

Exercícios Principais

P1.

(a) $\displaystyle\int \frac{2^x}{3+2^x}\,dx = \frac{\ln(3+2^x)}{\ln 2} + C.$

(b) $\displaystyle\int (1 - 2x^2\sec(5x^3))\,dx = x - \frac{2\ln|\sec(5x^3)+\operatorname{tg}(5x^3)|}{15} + C.$

(c) $\displaystyle\int \frac{x+2}{x^3+2x^2+5x}\,dx = \frac{2}{5}\ln|x| + \frac{3}{10}\operatorname{arctg}\left(\frac{x+1}{2}\right) - \frac{1}{5}\ln(x^2+2x+5) + C.$

(d) $\displaystyle\int (1 - x + e^{3x}\cos(2x))\,dx = x - \frac{x^2}{2} + \frac{(2\operatorname{sen}(2x)+3\cos(2x))e^{3x}}{13} + C.$

(e) $\displaystyle\int (x^2 - 2\sqrt[3]{x^2} - 3x^{-1})\,dx = \frac{x^3}{3} - \frac{6x^{5/3}}{5} - 3\ln|x| + C.$

(f) $\displaystyle\int \frac{1}{4+x^2}\,dx = \frac{1}{2}\operatorname{arctg}\left(\frac{x}{2}\right) + C.$

(g) $\displaystyle\int_0^{\pi/4} \cos^3 x\,dx = \frac{5}{6\sqrt{2}}.$

(h) $\displaystyle\int x\operatorname{tg}^2 x\,dx = x\operatorname{tg} x - \ln|\sec x| - \frac{x^2}{2} + C.$

(i) $\displaystyle\int \sqrt{1-4x^2}\,dx = \frac{\operatorname{arcsen}(2x)}{4} + \frac{x\sqrt{1-4x^2}}{2} + C.$

(j) $\displaystyle\int_0^1 \frac{x-4}{x^2-5x+6}\,dx = \ln 3 - 3\ln 2.$

(k) $\displaystyle\int_0^{\pi/8} (2x - \operatorname{sen}(2x)\operatorname{sen}(4x))\,dx = \frac{\pi^2}{64} - \frac{1}{6\sqrt{2}}.$

(l) $\displaystyle\int \operatorname{cossec}^2 x\sqrt{\operatorname{cotg} x}\,dx = -\frac{2\operatorname{cotg}^{3/2} x}{3} + C.$

(m) $\displaystyle\int_{-\pi/4}^{0} \cos^3(2x)\operatorname{sen}(2x)\,dx = -\frac{1}{8}.$

(n) $\displaystyle\int \sqrt{-x^2+2x+3}\,dx = 2\operatorname{arcsen}\left(\frac{x-1}{2}\right) + \frac{(x-1)\sqrt{-x^2+2x+3}}{2} + C.$

(o) $\displaystyle\int \operatorname{sen}^4 x \cos^2 x\, dx = \frac{x}{16} - \frac{\operatorname{sen}(2x)}{64} - \frac{\operatorname{sen}(4x)}{64} + \frac{\operatorname{sen}(6x)}{192} + C.$

(p) $\displaystyle\int_0^2 \frac{1}{\sqrt{4+x^2}}\, dx = \ln(1+\sqrt{2}).$

(q) $\displaystyle\int \operatorname{tg}^4 x\, dx = \frac{\operatorname{tg}^3 x}{3} - \operatorname{tg} x + x + C.$

(r) $\displaystyle\int e^{\sqrt{x}}\, dx = 2(\sqrt{x}-1)e^{\sqrt{x}} + C.$

(s) $\displaystyle\int \left(\sec^2(2x) + \frac{1+x}{1+x^2}\right) dx = \frac{\operatorname{tg}(2x)}{2} + \operatorname{arctg} x + \frac{\ln(1+x^2)}{2} + C.$