

UFF Universidade Federal Fluminense
 EGM - Instituto de Matemática
 GMA - Departamento de Matemática Aplicada

LISTA 2 - 2012-1
 Integral indefinida
 Integração por substituição

Calcule as integrais dos exercícios 1 a 24.

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| 1. $\int \sin 3x \cos 3x \, dx$ | 9. $\int \frac{x}{\sqrt{x-1}} \, dx$ | 17. $\int \sec x \tan x \, dx$ |
| 2. $\int \sin \theta \cos^3 \theta \, d\theta$ | 10. $\int x(1+x)^{\frac{4}{3}} \, dx$ | 18. $\int \tan x \, dx$ |
| 3. $\int \frac{\arctan x}{1+x^2} \, dx$ | 11. $\int \frac{\cos x}{4+\sin^2 x} \, dx$ | 19. $\int \cot x \, dx$ |
| 4. $\int \frac{dx}{\sqrt{x}(1+\sqrt{x})^2}$ | 12. $\int \tan^2 x \, dx$ | 20. $\int \frac{e^x}{\cos^2(e^x-2)} \, dx$ |
| 5. $\int \frac{dx}{4+3x^2}$ | 13. $\int \frac{\sin 2x}{3+\cos 2x} \, dx$ | 21. $\int \frac{\sin \sqrt{x}}{\sqrt{x}\sqrt{\cos^3 \sqrt{x}}} \, dx$ |
| 6. $\int \frac{x}{\sqrt{1-x^4}} \, dx$ | 14. $\int \frac{dx}{x \ln \sqrt{x}}$ | 22. $\int \frac{18 \tan^2 x \sec^2 x}{(2+\tan^3 x)^2} \, dx$ |
| 7. $\int \frac{y}{(3y-4)^3} \, dy$ | 15. $\int 3^x e^x \, dx$ | 23. $\int \frac{\cos(\ln x)}{x} \, dx$ |
| 8. $\int \frac{dt}{t^2+2t+2}$ | 16. $\int \frac{e^x}{\sqrt{1-e^{2x}}} \, dx$ | 24. $\int \frac{dx}{\sqrt{1-4x^2}}$ |

25. Encontre a expressão que define a função f , cujo gráfico contém o ponto $(0, \frac{8}{3})$ e cuja derivada é $f'(x) = x\sqrt{1-x^2}$.

Resolva os problemas de valor inicial dos exercícios 26 a 29.

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| 26. $\begin{cases} \frac{dy}{dx} = \frac{x}{\sqrt{2x^2+1}} \\ y(0) = 1 \end{cases}$ | 28. $\begin{cases} \frac{dy}{dx} = \frac{e^{1/x}}{x^2} \\ y(1) = 0 \end{cases}$ |
| 27. $\begin{cases} y' = \frac{x}{2x^2+e^2} \\ y(0) = 1 \end{cases}$ | 29. $\begin{cases} f'(x) = (1 - \sin^2 x) \sin 2x \\ f(\frac{\pi}{2}) = 0 \end{cases}$ |

Resolva as integrais definidas dos exercícios 30 a 37.

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| 30. $\int_2^3 \frac{x}{\sqrt{x-1}} \, dx$ | 33. $\int_1^e \frac{dx}{x(1+\ln^2 x)}$ | 36. $\int_0^{\frac{\pi}{4}} (1+e^{\tan x}) \sec^2 x \, dx$ |
| 31. $\int_1^2 \frac{e^x}{e^x+e} \, dx$ | 34. $\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^4}} \, dx$ | 37. $\int_{\ln \frac{\pi}{6}}^{\ln \frac{\pi}{2}} 2e^x \cos(e^x) \, dx$ |
| 32. $\int_0^{\sqrt{\ln \pi}} 2xe^{x^2} \cos(e^{x^2}) \, dx$ | 35. $\int_0^{\frac{\pi}{2}} e^{\sin x} \cos x \, dx$ | |

RESPOSTAS

1. $\frac{1}{6} (\sen 3x)^2 + C$
2. $-\frac{\cos^4 \theta}{4} + C$
3. $\frac{1}{2} (\arctan x)^2 + C$
4. $\frac{-2}{1 + \sqrt{x}} + C$
5. $\frac{\sqrt{3}}{6} \arctan \frac{\sqrt{3} x}{2} + C$
6. $\frac{1}{2} \arcsen x^2 + C$
7. $\frac{2 - 3y}{9(3y - 4)^2} + C$
8. $\arctan (t + 1) + C$
9. $\frac{2}{3} \sqrt{(x - 1)^3} + 2\sqrt{x - 1} + C$
10. $\frac{3(1 + x)^{\frac{10}{3}}}{10} - \frac{3(1 + x)^{\frac{7}{3}}}{7} + C$
11. $\frac{1}{2} \arctan \left(\frac{1}{2} \sen x \right) + C$
12. $-x + \tan x + C$
13. $-\frac{1}{2} \ln |3 + \cos 2x| + C$
14. $2 \ln |\ln \sqrt{x}| + C$
15. $\frac{3^x e^x}{1 + \ln 3} + C$
16. $\arcsen e^x + C$
17. $\sec x + C$
18. $\ln |\sec x| + C$
19. $-\ln |\csc x| + C$
20. $\tan (e^x - 2) + C$
21. $4 (\cos \sqrt{x})^{-\frac{1}{2}} + C$
22. $-\frac{6}{2 + \tan^3 x} + C$
23. $\sen (\ln x) + C$
24. $\frac{1}{2} \arcsen (2x) + C$
25. $f(x) = -\frac{1}{3} \sqrt{(1 - x^2)^3} + 3$
26. $y = \frac{1}{2} \sqrt{2x^2 + 1} + \frac{1}{2}$
27. $y = \frac{1}{4} \ln (2x^2 + e^2) + \frac{1}{2}$
28. $y = -e^{\frac{1}{x}} + e$
29. $f(x) = \sen^2 x - \frac{1}{2} \sen^4 x - \frac{1}{2}$
30. $\frac{10\sqrt{2} - 8}{3}$
31. $\ln \left(\frac{e + 1}{2} \right)$
32. $-\sen (1)$
33. $\frac{\pi}{4}$
34. $\frac{1}{2} \arcsen \left(\frac{1}{4} \right)$
35. e^{-1}
36. e
37. 1