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

LISTA 2 - 2011-2
Integral indefinida
Integração por substituição

Calcule as integrais dos exercícios 1 a 24.

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

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

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

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

Resolva as integrais definidas dos exercícios 30 a 37.

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

RESPOSTAS

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