Universidade de São Paulo
Escola Superior de Agricultura "Luiz de Queiroz"
Departamento de Ciências Exatas
LCE 0220 - Cálculo II
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Lista de Exercício: Integração por Partes

Resolver as seguintes integrais usando a técnica de integração por partes.

1. $\int x\sin(5x)\,dx$
2. $\int \ln(1-x)\,dx$
3. $\int te^{4t}\,dt$
4. $\int (x+1)\cos(2x)\,dx$
5. $\int x\ln(3x)\,dx$
6. $\int \cos^3(x)\,dx$
7. $\int e^x\cos(x/2)\,dx$
8. $\int \sqrt{x}\ln(x)\,dx$
9. $\int \mathrm{cosec}^3(x)\,dx$
10. $\int x^2\cos(ax)\,dx$
11. $\int x\mathrm{cosec}^2(x)\,dx$
12. $\int \text{arc cotg}(2x)\,dx$
13. $\int e^{ax}\sin(bx)\,dx$
14. $\int \dfrac{\ln(ax+b)}{\sqrt{ax+b}}\,dx$
15. $\int x^3\sqrt{1-x^2}\,dx$
16. $\int \ln^3(2x)\,dx$
17. $\int \text{arc tg}(ax)\,dx$
18. $\int x^3\sin(4x)\,dx$
19. $\int (x-1)e^{-x}\,dx$
20. $\int x^2\ln(x)\,dx$
21. $\int x^2e^x\,dx$
22. $\int \arcsin(x/2)\,dx$
23. $\int (x-1)\sec^2(x)\,dx$
24. $\int e^{3x}\cos(4x)\,dx$
25. $\int x^n\ln(x)\,dx,\ n\in\mathbb{R}$
26. $\int \ln(x^2+1)\,dx$
27. $\int \ln(x+\sqrt{1+x^2})\,dx$
28. $\int x\,\text{arctg}(x)\,dx$
29. $\int x^5e^{x^2}\,dx$
30. $\int x\cos^2(x)\,dx$
31. $\int (x+3)^2e^x\,dx$
32. $\int x\sqrt{x+1}\,dx$
33. $\int \cos[\ln(x)]\,dx$
34. $\int \arccos(x)\,dx$
35. $\int \sec^3(x)\,dx$
36. $\int \dfrac{1}{x^3}e^{1/x}\,dx$

Respostas:

1. $\dfrac{-x}{5}\cos(5x)+\dfrac{1}{25}\sin(5x)+c$
2. $(x-1)\ln(1-x)-x+c$
3. $\dfrac{e^{4t}}{4}\left(t-\dfrac{1}{4}\right)+c$

4. $\dfrac{(x+1)}{2}\sin(2x)+\dfrac{1}{4}\cos(2x)+c$

5. $\dfrac{x^2}{2}\left[\ln(3x)-\dfrac{1}{2}\right]+c$

6. $\cos^2(x)\sin(x)+\dfrac{2\sin^3(x)}{3}+c$

7. $\dfrac{2}{5}e^x\left[\sin\left(\dfrac{x}{2}\right)+2\cos\left(\dfrac{x}{2}\right)\right]+c$

8. $\dfrac{2}{3}x\sqrt{x}\ln(x)-\dfrac{4}{9}x\sqrt{x}+c$

9. $-\dfrac{1}{2}\text{cosec}(x)\text{cotg}(x)+\dfrac{1}{2}\ln|\text{cosec}(x)-\text{cotg}(x)|+c$

10. $\dfrac{x^2}{a}\sin(ax)+\dfrac{2x}{a^2}\cos(ax)-\dfrac{2}{a^3}\sin(ax)+c$

11. $-x\,\text{cotg}(x)+\ln|\sin(x)|+c$

12. $x\,\text{arc cotg}(2x)+\dfrac{1}{4}\ln(1+4x^2)+c$

13. $\dfrac{be^{ax}}{a^2+b^2}\left[-\cos(bx)+\dfrac{a}{b}\sin(bx)\right]+c$

14. $\dfrac{2}{a}\sqrt{ax+b}\,[\ln(ax+b)-2]+c$

15. $-\dfrac{x^2}{3}(1-x^2)\sqrt{1-x^2}-\dfrac{2}{15}(1-x^2)^2\sqrt{1-x^2}+c$

16. $x[\ln^3(2x)-3\ln^2(2x)+6\ln(2x)-6]+c$

17. $x\,\text{arc tg}(ax)-\dfrac{1}{2a}\ln(1+a^2x^2)+c$

18. $-\dfrac{x^3}{4}\cos(4x)+\dfrac{3}{16}x^2\sin(4x)+\dfrac{3x}{32}\cos(4x)-\dfrac{3}{128}\sin(4x)+c$

19. $-xe^{-x}+c$

20. $\dfrac{x^3}{3}\left[\ln(x)-\dfrac{1}{3}\right]+c$

21. $e^x[x^2-2x+2]+c$

22. $x\arcsin\left(\dfrac{x}{2}\right)+\sqrt{4-x^2}+c$

23. $(x-1)\text{tg}(x)+\ln|\cos(x)|+c$

24. $\dfrac{4}{25}\left[e^{3x}\sin(4x)+\dfrac{3}{4}e^{3x}\cos(4x)\right]+c$

25. $\dfrac{x^{n+1}}{n+1}\left[\ln(x)-\dfrac{1}{n+1}\right]+c$

26. $x\,\ln(x^2+1)-2x+2\text{arctg}(x)+c$

27. $x\,\ln(x+\sqrt{1+x^2})-\sqrt{1+x^2}+c$

28. $\dfrac{x^2}{2}\text{arctg}(x)-\dfrac{1}{2}x+\dfrac{1}{2}\text{arctg}(x)+c$

29. $e^{x^2}\left[\dfrac{x^4}{4}-x^2+1\right]+c$

30. $\dfrac{1}{4}\left[x^2+x\sin(2x)+\dfrac{1}{2}\cos(2x)\right]+c$

31. $e^x[x^2+4x+5]+c$

32. $\dfrac{2}{3}x(x+1)\sqrt{x+1}-\dfrac{4}{15}(x+1)^2\sqrt{x+1}+c$

33. $\dfrac{1}{2}x\cos(\ln(x))+\dfrac{1}{2}x\sin(\ln(x))+c$

34. $x\arccos(x)-\sqrt{1-x^2}+c$

35. $\dfrac{1}{2}[\sec(x)\text{tg}(x)+\ln|\sec(x)+\text{tg}(x)|]+c$

36. $-\dfrac{1}{x}e^{1/x}+e^{1/x}+c$

FLEMMING, D.M.; GONÇALVES, M.B. **Cálculo A: Funções, limites, derivação e integração**. 6^a ed. São Paulo. Pearson, 2012. 448p.