

6.6 Exercícios

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

1. $\int x \operatorname{sen} 5x dx$

3. $\int t e^{4t} dt$

5. $\int x \ln 3x dx$

7. $\int e^x \cos \frac{x}{2} dx$

9. $\int \operatorname{cosec}^3 x dx$

11. $\int x \operatorname{cosec}^2 x dx$

13. $\int e^{ax} \operatorname{sen} bx dx$

15. $\int x^3 \sqrt{1-x^2} dx$

17. $\int \operatorname{arc} \operatorname{tg} ax dx$

19. $\int (x-1)e^{-x} dx$

21. $\int x^2 e^x dx$

23. $\int (x-1) \sec^2 x dx$

25. $\int x^n \ln x dx, n \in \mathbb{N}$

27. $\int \ln(x + \sqrt{1+x^2}) dx$

2. $\int \ln(1-x) dx$

4. $\int (x+1) \cos 2x dx$

6. $\int \cos^3 x dx$

8. $\int \sqrt{x} \ln x dx$

10. $\int x^2 \cos ax dx$

12. $\int \operatorname{arc} \operatorname{cotg} 2x dx$

14. $\int \frac{\ln(ax+b)}{\sqrt{ax+b}} dx$

16. $\int \ln^3 2x dx$

18. $\int x^3 \operatorname{sen} 4x dx$

20. $\int x^2 \ln x dx$

22. $\int \operatorname{arc} \operatorname{sen} \frac{x}{2} dx$

24. $\int e^{3x} \cos 4x dx$

26. $\int \ln(x^2+1) dx$

28. $\int x \operatorname{arc} \operatorname{tg} x dx$

29. $\int x^5 e^{x^2} dx$

30. $\int x \cos^2 x dx$

31. $\int (x + 3)^2 e^x dx$

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. $\int \frac{1}{x^3} e^{1/x} dx.$

Gabarito

1. $\frac{-x}{5} \cos 5x + \frac{1}{25} \sin 5x + x$

2. $(x - 1) \ln(1 - x) - x + c$

3. $\frac{e^{4t}}{4} (t - \frac{1}{4}) + c$

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

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

6. $\cos^2 x \sin x + \frac{2 \sin^3 x}{3} + c$

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

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

9. $-\frac{1}{2} \operatorname{cosec} x \cotg x + \frac{1}{2} \ln | \operatorname{cosec} x - \cotg x | + c$

10. $\frac{x^2}{a} \operatorname{sen} ax + \frac{2x}{a^2} \cos ax - \frac{2}{a^3} \operatorname{sen} ax + c$ 11. $-x \operatorname{cotg} x + \ln |\operatorname{sen} x| + c$
12. $x \operatorname{arc} \operatorname{cotg} 2x + \frac{1}{4} \ln (1 + 4x^2) + c$ 13. $\frac{be^{ax}}{a^2 + b^2} \left[-\cos bx + \frac{a}{b} \operatorname{sen} bx \right] + c$
14. $\frac{2}{a} \sqrt{ax + b} [\ln(ax + b) - 2] + c$ 15. $-\frac{x^2}{3} (1 - x^2) \sqrt{1 - x^2} - \frac{2}{15} (1 - x^2)^2 \sqrt{1 - x^2} + c$
16. $x [\ln^2 2x - 3 \ln^2 2x + 6 \ln 2x - 6] + c$
17. $x \operatorname{arc} \operatorname{tg} ax - \frac{1}{2a} \ln (1 + a^2 x^2) + c$
18. $-\frac{x^3}{4} \cos 4x + \frac{3}{16} x^2 \operatorname{sen} 4x + \frac{3x}{32} \cos 4x - \frac{3}{128} \operatorname{sen} 4x + c$
19. $-x e^{-x} + c$ 20. $\frac{x^3}{3} \left[\ln x - \frac{1}{3} \right] + c$ 21. $e^x [x^2 - 2x + 2] + c$
22. $x \operatorname{arc} \operatorname{sen} \frac{x}{2} + \sqrt{4 - x^2} + c$ 23. $(x - 1) \operatorname{tg} x + \ln |\cos x| + c$
24. $\frac{4}{25} \left[e^{3x} \operatorname{sen} 4x + \frac{3}{4} e^{3x} \cos 4x \right] + c$ 25. $\frac{x^{n+1}}{n+1} \left[\ln x - \frac{1}{n+1} \right] + c$
26. $x \ln (x^2 + 1) - 2x + 2 \operatorname{arc} \operatorname{tg} x + c$ 27. $x \ln (x + \sqrt{1 + x^2}) - \sqrt{1 + x^2} + c$
28. $\frac{x^2}{2} \operatorname{arc} \operatorname{tg} x - \frac{1}{2} x + \frac{1}{2} \operatorname{arc} \operatorname{tg} x + c$ 29. $e^{x^2} \left[\frac{x^4}{4} - x^2 + 1 \right] + c$
30. $\frac{1}{4} \left[x^2 + x \operatorname{sen} 2x + \frac{1}{2} \cos 2x \right] + c$ 31. $e^x [x^2 + 4x + 5] + c$
32. $\frac{2}{3} x(x+1) \sqrt{x+1} - \frac{4}{15} (x+1)^2 \sqrt{x+1} + c$
33. $\frac{1}{2} x \cos (\ln x) + \frac{1}{2} x \operatorname{sen} (\ln x) + c$ 34. $x \operatorname{arc} \cos x - \sqrt{1 - x^2} + c$
35. $\frac{1}{2} [\sec x \operatorname{tg} x + \ln |\sec x + \operatorname{tg} x|] + c$ 36. $-\frac{1}{x} e^{1/x} + e^{1/x} + c$