

Bacharelado em Física Diurno
Cálculo Diferencial e Integral I - 7ª lista de exercícios

Integrais Indefinidas. Calcule as integrais indefinidas abaixo. Lembre-se de que

$$\int f(x)dx = F(x) + k \text{ (} k \text{ constante) } \Leftrightarrow F'(x) = f(x), \forall x \in D_f.$$

1. $\int \frac{x^7 + x^2 + 1}{x^2} dx$

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

3. $\int \cos 7x dx$

4. $\int tg^2 x dx$

5. $\int \frac{7}{x-2} dx$

6. $\int tg^3 x \sec^2 x dx$

7. $\int \frac{\sen^3 x}{\sqrt{\cos x}} dx$

8. $\int tg x dx$

9. $\int tg^3 x dx$

10. $\int \frac{x}{1+x^2} dx$

11. $\int \frac{x}{1+x^4} dx$

12. $\int \frac{x^2}{1+x^2} dx$

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

14. $\int \sec x dx$

15. $\int \frac{1}{x \sqrt{1+\ln x}} dx$

16. $\int x^2 \sqrt[5]{x^3+1} dx$

17. $\int \frac{4x+8}{2x^2+8x+20} dx$

18. $\int \frac{\sqrt{\ln x}}{x} dx$

19. $\int \frac{dx}{(\arcsen x) \sqrt{1-x^2}}$

20. $\int \frac{e^x}{1+e^x} dx$

21. $\int \frac{\sen 2x}{1+\cos^2 x} dx$

22. $\int e^{x^3} x^2 dx$

23. $\int e^x \sqrt[3]{1+e^x} dx$

24. $\int \frac{\sen \sqrt{x}}{\sqrt{x}} dx$

25. $\int \frac{e^{\arctg x}}{1+x^2} dx$

26. $\int 2x(x+1)^{2002} dx$

27. $\int x \sen x dx$

28. $\int e^x \cos x dx$

29. $\int x \ln x dx$

30. $\int \ln x dx$

31. $\int x e^{-x} dx$

32. $\int x \arctg x dx$

33. $\int \arcsen x dx$

34. $\int \sec^3 x dx$

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

36. $\int \sen^2 x \cos^3 x dx$

37. $\int \sen^2 x \cos^2 x dx$

38. $\int \frac{1-\sen x}{\cos x} dx$

39. $\int \frac{3x^2+4x+5}{(x-1)(x-2)(x-3)} dx$

$$\begin{array}{lll}
40. \int \frac{1}{2x^2 + 8x + 20} dx & 41. \int \frac{3x^2 + 4x + 5}{(x-1)^2(x-2)} dx & 42. \int \frac{x^5 + x + 1}{x^3 - 8} dx \\
43. \int \frac{x^2}{\sqrt{1-x^2}} dx & 44. \int x^2 \sqrt{1-x^2} dx & 45. \int e^{\sqrt{x}} dx \\
46. \int \ln(x + \sqrt{1+x^2}) dx & 47. \int \frac{dx}{\sqrt{5-2x+x^2}} & 48. \int \sqrt{x} \ln x dx \\
49. \int \operatorname{sen}(\ln x) dx & 50. \int \frac{x}{x^2 - 4} dx & 51. \int \frac{3x^2 + 5x + 4}{x^3 + x^2 + x - 3} dx \\
52. \int \sqrt{a^2 + b^2 x^2} dx & 53. \int \frac{1}{\sqrt{a^2 + b^2 x^2}} dx & 54. \int \sqrt{x^2 - 2x + 2} dx \\
55. \int \sqrt{3 - 2x - x^2} dx & 56. \int \frac{1}{(1+x^2)\sqrt{1-x^2}} dx & 57. \int \cos^3 x dx \\
58. \int \operatorname{sen}^5 x dx & 59. \int \frac{\cos^5 x}{\operatorname{sen}^3 x} dx & 60. \int \operatorname{sen}^3\left(\frac{x}{2}\right) \cos^5\left(\frac{x}{2}\right) dx \\
61. \int \frac{1}{\operatorname{sen}^5 x \cos^3 x} dx & 62. \int \operatorname{sen}^4 x dx & 63. \int \operatorname{sen}^2 x \cos^5 x dx \\
64. \int \operatorname{sen}^2 x \cos^4 x dx & 65. \int \cos^6(3x) dx & 66. \int \frac{\cos^2 x}{\operatorname{sen}^6 x} dx \\
67. \int \frac{1}{\operatorname{sen}^2 x \cos^4 x} dx & 68. \int \sqrt{\frac{1-x}{1+x}} dx & 69. \int \frac{1}{\sqrt{x} - \sqrt[3]{x}} dx \\
& & \text{(Sugestão: Faça } u = \sqrt[6]{x}\text{)}
\end{array}$$

RESPOSTAS

$$\begin{array}{lll}
1) \frac{x^6}{6} + x - \frac{1}{x} + k & 2) \frac{e^{2x}}{2} + k & 3) \frac{\operatorname{sen} 7x}{7} + k \\
4) \operatorname{tg} x - x + k & 5) 7 \ln |x - 2| + k & 6) \frac{\operatorname{tg}^4 x}{4} + k \\
7) 2\sqrt{\cos x} \left(\frac{\cos^2 x}{5} - 1 \right) + k & 8) -\ln |\cos x| + k & 9) \frac{\operatorname{tg}^2 x}{2} + \ln |\cos x| + k \\
10) \frac{1}{2} \ln(1 + x^2) + k & 11) \frac{1}{2} \operatorname{arctg} x^2 + k & 12) x - \operatorname{arctg} x + k
\end{array}$$

- 13) $-\frac{1}{3}\sqrt{(1-x^2)^3} + k$ 14) $\ln|\sec x + \operatorname{tg} x| + k$ 15) $2\sqrt{1+\ln x} + k$
- 16) $\frac{5}{18}\sqrt[5]{(x^3+1)^6} + k$ 17) $\ln(2x^2+8x+20) + k$ 18) $\frac{2}{3}\sqrt{(\ln x)^3} + k$
- 19) $\ln|\operatorname{arcsen} x| + k$ 20) $\ln(1+e^x) + k$ 21) $-\ln(1+\cos^2 x) + k$
- 22) $\frac{1}{3}e^{x^3} + k$ 23) $\frac{3}{4}\sqrt[3]{(1+e^x)^4} + k$ 24) $-2\cos\sqrt{x} + k$
- 25) $e^{\operatorname{arctg} x} + k$ 26) $2(x+1)^{2003}\left(\frac{x+1}{2004} - \frac{1}{2003}\right) + k$
- 27) $-x\cos x + \operatorname{sen} x + k$ 28) $\frac{1}{2}e^x(\operatorname{sen} x + \cos x) + k$
- 29) $\frac{x^2}{2}\ln x - \frac{x^2}{4} + k$ 30) $x\ln x - x + k$
- 31) $(-x-1)e^{-x} + k$ 32) $\frac{x^2}{2}\operatorname{arctg} x - \frac{x}{2} + \frac{1}{2}\operatorname{arctg} x + k$
- 33) $x\operatorname{arcsen} x + \sqrt{1-x^2} + k$ 34) $\frac{1}{2}\sec x \operatorname{tg} x + \frac{1}{2}\ln|\sec x + \operatorname{tg} x| + k$
- 35) $\frac{1}{2}(x - \operatorname{sen} x \cos x) + k$ 36) $\frac{\operatorname{sen}^3 x}{3} - \frac{\operatorname{sen}^5 x}{5} + k$
- 37) $\frac{1}{8}\left(x - \frac{\operatorname{sen} 4x}{4}\right) + k$ 38) $\ln|1 + \operatorname{sen} x| + k$
- 39) $6\ln|x-1| - 25\ln|x-2| + 22\ln|x-3| + k$ 40) $\frac{\sqrt{6}}{12}\operatorname{arctg}\left(\frac{x+2}{\sqrt{6}}\right) + k$
- 41) $-22\ln|x-1| + \frac{12}{x-1} + 25\ln|x-2| + k$
- 42) $\frac{x^3}{3} + \frac{35}{12}\ln|x-2| + \frac{61}{24}\ln\left[1 + \left(\frac{x+1}{\sqrt{3}}\right)^2\right] + \frac{\sqrt{3}}{12}\operatorname{arctg}\left(\frac{x+1}{\sqrt{3}}\right) + k$
- 43) $\frac{1}{2}\operatorname{arcsen} x - \frac{1}{2}x\sqrt{1-x^2} + k$ 44) $\frac{x}{8}(2x^2-1)\sqrt{1-x^2} + \frac{1}{8}\operatorname{arcsen} x + k$
- 45) $2(\sqrt{x}-1)e^{\sqrt{x}} + k$ 46) $x\ln(x + \sqrt{1+x^2}) - \sqrt{1+x^2} + k$
- 47) $\ln|\sqrt{5-2x+x^2} + x-1| + k$ 48) $\frac{2}{3}x\sqrt{x}\left(\ln x - \frac{2}{3}\right) + k$

$$49) \frac{x}{2} [\text{sen}(\ln x) - \cos(\ln x)] + k$$

$$50) \frac{1}{2} \ln |x^2 - 4| + k$$

$$51) 2 \ln |x - 1| + \frac{1}{2} \ln(x^2 + 2x + 3) + \frac{1}{\sqrt{2}} \text{arctg} \frac{x+1}{\sqrt{2}} + k$$

$$52) x\sqrt{a^2 + b^2x^2} + \frac{a^2}{2b} \ln \left[\frac{bx}{a} + \frac{\sqrt{a^2 + b^2x^2}}{a} \right] + k$$

$$53) \frac{1}{b} \ln \left[\frac{bx}{a} + \frac{\sqrt{a^2 + b^2x^2}}{a} \right] + k$$

$$54) \frac{x-1}{2} \sqrt{x^2 - 2x + 2} + \frac{1}{2} \ln(x - 1 + \sqrt{x^2 - 2x + 2}) + k$$

$$55) \left(\frac{x+1}{2} \right) \sqrt{3 - 2x - x^2} + 2 \arcsen \left(\frac{x+1}{2} \right) + k$$

$$56) \frac{1}{\sqrt{2}} \text{arctg} \left(\frac{x\sqrt{2}}{\sqrt{1-x^2}} \right) + k$$

$$57) \text{sen } x - \frac{1}{3} \text{sen}^3 x + k$$

$$58) -\cos x + \frac{2}{3} \cos^3 x - \frac{1}{5} \cos^5 x + k$$

$$59) \frac{\text{sen}^2 x}{2} - \frac{1}{2 \text{sen}^2 x} - 2 \ln |\text{sen } x| + k$$

$$60) \frac{1}{4} \cos^8 \left(\frac{x}{2} \right) - \frac{1}{3} \cos^6 \left(\frac{x}{2} \right) + k$$

$$61) \frac{\text{tg}^2 x}{2} + 3 \ln |\text{tg } x| - \frac{3}{2 \text{tg}^2 x} - \frac{1}{4 \text{tg}^4 x} + k$$

$$62) \frac{3x}{8} - \frac{\text{sen}(2x)}{4} + \frac{\text{sen}(4x)}{32} + k$$

$$63) \frac{\text{sen}^3 x}{3} - 2 \frac{\text{sen}^5 x}{5} + \frac{\text{sen}^7 x}{7} + k$$

$$64) \frac{x}{16} - \frac{\text{sen}(4x)}{64} + \frac{\text{sen}^3(2x)}{48} + k$$

$$65) \frac{5}{16} x + \frac{1}{12} \text{sen}(6x) + \frac{1}{64} \text{sen}(12x) - \frac{\text{sen}^3(6x)}{144} + k$$

$$66) -\frac{\cotg^3 x}{3} - \frac{\cotg^5 x}{5} + k$$

$$67) \text{tg } x + \frac{\text{tg}^3 x}{3} - 2 \cotg(2x) + k$$

$$68) \arcsen x + \sqrt{1-x^2} + k$$

$$69) 2\sqrt{x} + 3\sqrt[3]{x} + 6\sqrt[6]{x} + 6 \ln |\sqrt[6]{x} - 1| + k$$