

## LISTA 1

Utilizando a técnica de integração por partes, calcule as integrais dos exercícios 1. a 18.

- |                          |                             |   |
|--------------------------|-----------------------------|---|
| 1. $\int \arcsen x dx$   | 7. $\int (\ln x)^3 dx$      | 13. $\int \operatorname{arcsec} \sqrt{x} dx$    |
| 2. $\int x \sen x dx$    | 8. $\int \sqrt{x} \ln x dx$ | 14. $\int \frac{\ln(\ln x)}{x} dx$              |
| 3. $\int x^2 \ln x dx$   | 9. $\int x(\ln x)^2 dx$     | 15. $\int \frac{\arctan \sqrt{x}}{\sqrt{x}} dx$ |
| 4. $\int x^2 \cos x dx$  | 10. $\int x 3^x dx$         | 16. $\int \csc^5 x dx$                          |
| 5. $\int x \arctan x dx$ | 11. $\int x \sec^2 x dx$    | 17. $\int \sen 3x \cos 2x dx$                   |
| 6. $\int \sec^3 x dx$    | 12. $\int \sen(\ln x) dx$   |   |

Nos exercícios 18. a 29. calcule as integrais do produto ou quociente de potências de funções trigonométricas.

- |                                 |  |   |
|---------------------------------|--|---|
| 18. $\int \sen^4 x dx$          | 22. $\int_0^{\frac{\pi}{2}} \sqrt{\cos x} \sen^3 x dx$                     | 26. $\int \tan^5 x \sec^3 x dx$         |
| 19. $\int \sen^4 x \cos^2 x dx$ | 23. $\int \frac{\sen^3 x}{\cos^4 x} dx$                                    | 27. $\int \tan^3 x \sqrt{\sec x} dx$    |
| 20. $\int \sen^3 x \cos^2 x dx$ | 24. $\int_0^{\frac{1}{2}} \cos(\pi x) \cos\left(\frac{\pi x}{2}\right) dx$ | 28. $\int \frac{\tan^5 x}{\sec^3 x} dx$ |
| 21. $\int \cos^5 x dx$          | 25. $\int \tan^2 x \sec^3 x dx$  | 29. $\int \cot^4 x dx$                  |

Lista de algumas fórmulas exponenciais e trigonométricas que eventualmente serão usadas nas resoluções de algumas integrais:

$$(I) a^x = e^{x \ln a}, \quad a \in \mathbb{R}, a > 0$$

$$(II) \sen^2 x + \cos^2 x = 1 \quad (III) 1 + \tan^2 x = \sec^2 x \quad (IV) 1 + \cot^2 x = \csc^2 x$$

$$(V) \cos^2 x = \frac{1 + \cos 2x}{2} \quad (VI) \sen^2 x = \frac{1 - \cos 2x}{2}$$

$$(VII) \sen a \cos b = \frac{\sen(a-b) + \sen(a+b)}{2} \quad (VIII) \sen a \sen b = \frac{\cos(a-b) - \cos(a+b)}{2}$$

$$(IX) \cos a \cos b = \frac{\cos(a-b) + \cos(a+b)}{2}$$

## RESPOSTAS DA LISTA 1

1.  $x \arcsen x + \sqrt{1-x^2} + C$
2.  $\sen x - x \cos x + C$
3.  $\frac{1}{3}x^3 \ln x - \frac{1}{9}x^3 + C$
4.  $x^2 \sen x + 2x \cos x - 2 \sen x + C$
5.  $\frac{1}{2}(x^2 \arctan x - x + \arctan x) + C$
6.  $\frac{1}{2}(\sec x \tan x + \ln |\sec x + \tan x|) + C$
7.  $x(\ln x)^3 - 3x(\ln x)^2 + 6x \ln x - 6x + C$
8.  $\frac{2}{3}x^{\frac{3}{2}} \ln x - \frac{4}{9}x^{\frac{3}{2}} + C$
9.  $\frac{1}{2}x^2(\ln x)^2 - \frac{1}{2}x^2(\ln x) + \frac{1}{4}x^2 + C$
10.  $\frac{1}{\ln 3} x 3^x - \frac{1}{(\ln 3)^2} 3^x + C$
11.  $x \tan x - \ln |\sec x| + C$
12.  $\frac{1}{2}x(\sen(\ln x) - \cos(\ln x)) + C$
13.  $x \operatorname{arcsec} \sqrt{x} - (x-1)^{\frac{1}{2}} + C$
14.  $\ln x \ln(\ln x) - \ln x + C$
15.  $2\sqrt{x} \arctan(\sqrt{x}) - \ln(1+x) + C$
16.  $-\frac{1}{4} \csc^3 x \cot x - \frac{3}{8} \cot x \csc x - \frac{3}{8} \ln |\csc x - \cot x| + C$
17.  $-\frac{1}{10} \cos 5x - \frac{1}{2} \cos x + C$
18.  $\frac{3}{8}x + \frac{1}{32} \sen 4x - \frac{1}{4} \sen 2x + C$
19.  $\frac{1}{16}x - \frac{1}{64} \sen 4x - \frac{1}{48} \sen^3 2x + C$
20.  $-\frac{1}{5} \cos^3 x \sen^2 x - \frac{2}{15} \cos^3 x + C$
21.  $\frac{1}{5} \sen^5 x - \frac{2}{3} \sen^3 x + \sen x + C$
22.  $\frac{2}{7} \cos^{\frac{7}{2}} x - \frac{2}{3} \cos^{\frac{3}{2}} x \Big|_0^{\frac{\pi}{2}} = \frac{8}{21}$
23.  $\frac{1}{3} \cos^{-3} x - \cos^{-1} x + C$
24.  $\left( \frac{1}{3\pi} \sen \frac{3\pi x}{2} + \frac{1}{\pi} \sen \frac{\pi x}{2} \right) \Big|_0^{\frac{1}{2}} = \frac{2\sqrt{2}}{3\pi}$
25.  $\frac{1}{4} \sec^3 x \tan x - \frac{1}{8} \sec x \tan x - \frac{1}{8} \ln |\sec x + \tan x| + C$
26.  $\frac{1}{7} \sec^7 x - \frac{2}{5} \sec^5 x + \frac{1}{3} \sec^3 x + C$
27.  $\frac{2}{5} \sec^{\frac{5}{2}} x - 2 \sec^{\frac{1}{2}} x + C$
28.  $\sec x + 2 \sec^{-1} x - \frac{1}{3} \sec^{-3} x + C$
29.  $\cot x - \frac{1}{3} \cot^3 x + x + C$