PROBLEMAS QUENTES ■ PÁGINA 423

1. (a) $f(t) = 3t^2$ (b) $f(x) = \sqrt{2x/\pi}$ **3.** $\frac{32}{27}$

5. (b) 0,2261 (c) 0,6736 m
(d) (i) $3/(119\pi) \approx 0{,}008$ cm/s (ii) $1\,664\pi/9\text{s} \approx 9{,}7$ min

9. $y = \frac{32}{9}x^2$

11. (a) $V = \int_0^h \pi[f(y)]^2\,dy$ (c) $f(y) = \sqrt{kA/(\pi C)}\,y^{1/4}$
Vantagem: as marcas no recipiente são igualmente espaçadas.

13. $b = 2a$ **15.** $B = 16A$

CAPÍTULO 7

EXERCÍCIOS 7.1 ■ PÁGINA 432

1. $\frac{1}{3}x^3 \ln x - \frac{1}{9}x^3 + C$ **3.** $\frac{1}{5}x \operatorname{sen} 5x + \frac{1}{25}\cos 5x + C$

5. $2(r-2)e^{r/2} + C$

7. $\frac{1}{3}x^2 \operatorname{sen} 3x + \frac{2}{9}x\cos 3x - \frac{2}{27}\operatorname{sen} 3x + C$

9. $\frac{1}{2}(2x+1)\ln(2x+1) - x + C$

11. $t \operatorname{arctg} 4t - \frac{1}{8}\ln(1+16t^2) + C$

13. $\frac{1}{2}t \operatorname{tg} 2t - \frac{1}{4}\ln|\sec 2t| + C$

15. $x(\ln x)^2 - 2x\ln x + 2x + C$

17. $\frac{1}{13}e^{2\theta}(2\operatorname{sen} 3\theta - 3\cos 3\theta) + C$

19. $\pi/3$ **21.** $1 - 1/e$ **23.** $\frac{1}{2} - \frac{1}{2}\ln 2$ **25.** $\frac{1}{4} - \frac{3}{4}e^{-2}$

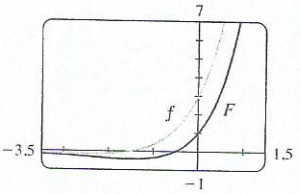
27. $\frac{1}{6}(\pi + 6 - 3\sqrt{3})$ **29.** $\operatorname{sen} x(\ln \operatorname{sen} x - 1) + C$

31. $\frac{32}{5}(\ln 2)^2 - \frac{64}{25}\ln 2 + \frac{62}{125}$

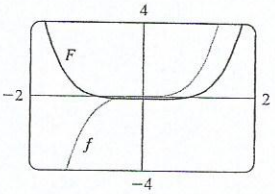
33. $2\sqrt{x}\operatorname{sen}\sqrt{x} + 2\cos\sqrt{x} + C$ **35.** $-\frac{1}{2} - \pi/4$

37. $\frac{1}{2}(x^2-1)\ln(1+x) - \frac{1}{4}x^2 + \frac{1}{2}x + \frac{3}{4} + C$

39. $(2x+1)e^x + C$



41. $\frac{1}{3}x^2(1+x^2)^{3/2} - \frac{2}{15}(1+x^2)^{5/2} + C$



43. (b) $-\frac{1}{4}\cos x \operatorname{sen}^3 x + \frac{3}{8}x - \frac{3}{16}\operatorname{sen} 2x + C$

45. (b) $\frac{2}{3}, \frac{8}{15}$ **51.** $x(\ln x)^3 - 3x(\ln x)^2 + 6x\ln x - 6x + C$

53. $\frac{25}{4} - \frac{75}{4}e^{-2}$ **55.** 1,0475, 2,8731; 2,1828 **57.** $4 - 8/\pi$

59. $2\pi e$ **61.** $\frac{9}{2}\ln 3 - \frac{13}{9}$ **63.** $2 - e^{-t}(t^2 + 2t + 2)$ m

65. 2

EXERCÍCIOS 7.2 ■ PÁGINA 439

1. $\frac{1}{5}\cos^5 x - \frac{1}{3}\cos^3 x + C$ **3.** $-\frac{11}{384}$

5. $\frac{1}{3\pi}\operatorname{sen}^3(\pi x) - \frac{2}{5\pi}\operatorname{sen}^5(\pi x) + \frac{1}{7\pi}\operatorname{sen}^7(\pi x) + C$

7. $\pi/4$ **9.** $\frac{3}{8}t + \frac{1}{4}\operatorname{sen} 2t + \frac{1}{32}\operatorname{sen} 4t + C$

11. $\frac{3}{2}\theta + 2\operatorname{sen}\theta + \frac{1}{4}\operatorname{sen} 2\theta + C$

13. $\pi/16$ **15.** $\frac{2}{45}\sqrt{\operatorname{sen}\alpha}\,(45 - 18\operatorname{sen}^2\alpha + 15\operatorname{sen}^4\alpha) + C$

17. $\frac{1}{2}\cos^2 x - \ln|\cos x| + C$ **19.** $\ln|\operatorname{sen} x| + 2\operatorname{sen} x + C$

21. $\frac{1}{2}\operatorname{tg}^2 x + C$ **23.** $\operatorname{tg} x - x + C$

25. $\frac{1}{5}\operatorname{tg}^5 t + \frac{2}{3}\operatorname{tg}^3 t + \operatorname{tg} t + C$ **27.** $\frac{117}{8}$

29. $\frac{1}{3}\sec^3 x - \sec x + C$

31. $\frac{1}{4}\sec^4 x - \operatorname{tg}^2 x + \ln|\sec x| + C$

33. $\frac{1}{6}\operatorname{tg}^6\theta + \frac{1}{4}\operatorname{tg}^4\theta + C$

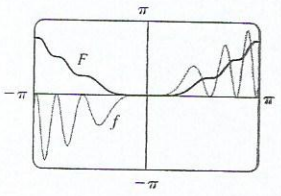
35. $x\sec x - \ln|\sec x\ \operatorname{tg} x| + C$ **37.** $\sqrt{3} - \frac{1}{3}\pi$

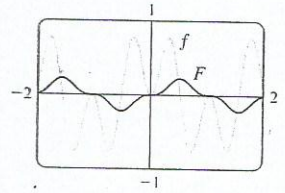
39. $\frac{1}{3}\operatorname{cossec}^3\alpha - \frac{1}{5}\operatorname{cossec}^5\alpha + C$ **41.** $\ln|\operatorname{cossec} x - \operatorname{cotg} x| + C$

43. $-\frac{1}{6}\cos 3x - \frac{1}{26}\cos 13x + C$ **45.** $\frac{1}{4}\operatorname{sen} 2\theta + \frac{1}{24}\operatorname{sen} 12\theta + C$

47. $\frac{1}{2}\operatorname{sen} 2x + C$ **49.** $\frac{1}{10}\operatorname{tg}^5(t^2) + C$

51. $\frac{1}{4}x^2 - \frac{1}{4}\operatorname{sen}(x^2)\cos(x^2) + C$ **53.** $\frac{1}{6}\operatorname{sen} 3x - \frac{1}{18}\operatorname{sen} 9x + C$





55. 0 **57.** 1 **59.** 0 **61.** $\pi^2/4$ **63.** $\pi(2\sqrt{2} - \frac{5}{2})$

65. $s = (1 - \cos^3\omega t)/(3\omega)$

EXERCÍCIOS 7.3 ■ PÁGINA 445

1. $\sqrt{x^2-9}/(9x) + C$ **3.** $\frac{1}{3}(x^2-18)\sqrt{x^2+9} + C$

5. $\pi/24 + \sqrt{3}/8 - \frac{1}{4}$ **7.** $-\sqrt{25-x^2}/(25x) + C$

9. $\ln(\sqrt{x^2+16} + x) + C$ **11.** $\frac{1}{4}\operatorname{sen}^{-1}(2x) + \frac{1}{2}x\sqrt{1-4x^2} + C$

13. $\frac{1}{6}\sec^{-1}(x/3) - \sqrt{x^2-9}/(2x^2) + C$

15. $\frac{1}{16}\pi a^4$ **17.** $\sqrt{x^2-7} + C$

19. $\ln|(\sqrt{1+x^2}-1)/x| + \sqrt{1+x^2} + C$ **21.** $\frac{9}{500}\pi$

23. $\frac{9}{2}\operatorname{sen}^{-1}((x-2)/3) - \frac{1}{2}(x-2)\sqrt{5+4x-x^2} + C$

25. $\sqrt{x^2+x+1} - \frac{1}{2}\ln\left(\sqrt{x^2+x+1} + x + \frac{1}{2}\right) + C$

27. $\frac{1}{2}(x+1)\sqrt{x^2+2x} - \frac{1}{2}\ln|x+1+\sqrt{x^2+2x}| + C$

29. $\frac{1}{4}\operatorname{sen}^{-1}(x^2) + \frac{1}{4}x^2\sqrt{1-x^4} + C$

33. $\frac{1}{6}(\sqrt{48} - \sec^{-1}7)$ **37.** 0,81, 2; 2,10

41. $r\sqrt{R^2-r^2} + \pi r^2/2 - R^2 \operatorname{arcsen}(r/R)$ **43.** $2\pi^2 Rr^2$