Seção 11.9

1. $\displaystyle\sum_{n=0}^{\infty} \frac{(-5x)^n}{n!} = 1 - 5x + \frac{5^2 x^2}{2!} - \frac{5^3 x^3}{3!} + \cdots$

3. $\displaystyle\sum_{n=0}^{\infty} \frac{5(-1)^n(-x)^{2n+1}}{(2n+1)!} = \sum_{n=0}^{\infty} \frac{5(-1)^{n+1}x^{2n+1}}{(2n+1)!}$
$= -5x + \frac{5x^3}{3!} - \frac{5x^5}{5!} + \frac{5x^7}{7!} + \cdots$

5. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n(x+1)^n}{(2n)!}$

7. $\displaystyle\sum_{n=0}^{\infty} \frac{x^{n+1}}{n!} = x + x^2 + \frac{x^3}{2!} + \frac{x^4}{3!} + \frac{x^5}{4!} + \cdots$

9. $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!} = \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!} + \cdots$

11. $x - \dfrac{\pi^2 x^3}{2!} + \dfrac{\pi^4 x^5}{4!} - \dfrac{\pi^6 x^7}{6!} + \cdots = \displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n} x^{2n+1}}{(2n)!}$

13. $1 + \displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n(2x)^{2n}}{2 \cdot (2n)!} =$
$1 - \dfrac{(2x)^2}{2 \cdot 2!} + \dfrac{(2x)^4}{2 \cdot 4!} - \dfrac{(2x)^6}{2 \cdot 6!} + \dfrac{(2x)^8}{2 \cdot 8!} - \cdots$

15. $x^2 \displaystyle\sum_{n=0}^{\infty} (2x)^n = x^2 + 2x^3 + 4x^4 + \cdots$

17. $\displaystyle\sum_{n=1}^{\infty} nx^{n-1} = 1 + 2x + 3x^2 + 4x^3 + \cdots$

19. $|x| < (0,06)^{1/5} < 0,56968$

21. $|Erro| < (10^{-3})^3/6 < 1,67 \times 10^{-10}, -10^{-3} < x < 0$

23. $|Erro| < (3^{0,1})(0,1)^3/6 < 1,87 \times 10^{-4}$ 25. 0,000293653

27. $|x| < 0,002$ 31. sen x, $x = 0,1$; sen $(0,1)$

33. tg$^{-1} x$, $x = \pi/3$

35. $e^x \operatorname{sen} x = x + x^2 + \dfrac{x^3}{3} - \dfrac{x^5}{30} - \dfrac{x^6}{90} \cdots$

43. (a) $Q(x) = 1 + kx + \dfrac{k(k-1)}{2}x^2$ (b) para $0 \le x < 100^{-1/3}$

49. (a) -1 (b) $\left(1/\sqrt{2}\right)(1 + i)$ (c) $-i$

53. $x + x^2 + \dfrac{1}{3}x^3 - \dfrac{1}{30}x^5 \cdots$; convergirá para qualquer valor de x

Seção 11.10

1. $1 + \dfrac{x}{2} - \dfrac{x^2}{8} + \dfrac{x^3}{16}$ 3. $1 + \dfrac{1}{2}x + \dfrac{3}{8}x^2 + \dfrac{5}{16}x^3 + \cdots$

5. $1 - x + \dfrac{3x^2}{4} - \dfrac{x^3}{2}$ 7. $1 - \dfrac{x^3}{2} + \dfrac{3x^6}{8} - \dfrac{5x^9}{16}$

9. $1 + \dfrac{1}{2x} - \dfrac{1}{8x^2} + \dfrac{1}{16x^3}$

11. $(1 + x)^4 = 1 + 4x + 6x^2 + 4x^3 + x^4$

13. $(1 - 2x)^3 = 1 - 6x + 12x^2 - 8x^3$

15. $y = \displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n}{n!}x^n = e^{-x}$ 17. $y = \displaystyle\sum_{n=1}^{\infty} (x^n/n!) = e^x - 1$

19. $y = \displaystyle\sum_{n=2}^{\infty} (x^n/n!) = e^x - x - 1$ 21. $y = \displaystyle\sum_{n=0}^{\infty} \frac{x^{2n}}{2^n n!} = e^{x^2/2}$

23. $y = \displaystyle\sum_{n=0}^{\infty} 2x^n = \frac{2}{1-x}$ 25. $y = \displaystyle\sum_{n=0}^{\infty} \frac{x^{2n+1}}{(2n+1)!} = \operatorname{senh} x$

27. $y = 2 + x - 2\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}x^{2n}}{(2n)!}$

29. $y = x - 2\displaystyle\sum_{n=0}^{\infty} \frac{x^{2n}}{(2n)!} - 3\displaystyle\sum_{n=0}^{\infty} \frac{x^{2n+1}}{(2n+1)!}$

31. $y = a + bx + \dfrac{1}{6}x^3 - \dfrac{ax^4}{3 \cdot 4} - \dfrac{bx^5}{4 \cdot 5} - \dfrac{x^7}{6 \cdot 6 \cdot 7} +$
$\dfrac{ax^8}{3 \cdot 4 \cdot 7 \cdot 8} + \dfrac{bx^9}{4 \cdot 5 \cdot 8 \cdot 9} \cdots$

33. 0,00267   35. 0,1   37. 0,0999444611   39. 0,100001

41. $1/(13 \cdot 6!) \approx 0,00011$ 43. $\dfrac{x^3}{3} - \dfrac{x^7}{7 \cdot 3!} + \dfrac{x^{11}}{11 \cdot 5!}$

45. (a) $\dfrac{x^2}{2} - \dfrac{x^4}{12}$

(b) $\dfrac{x^2}{2} - \dfrac{x^4}{3 \cdot 4} + \dfrac{x^6}{5 \cdot 6} - \dfrac{x^8}{7 \cdot 8} + \cdots + (-1)^{15}\dfrac{x^{32}}{31 \cdot 32}$

47. $1/2$ 49. $-1/24$ 51. $1/3$ 53. -1 55. 2

59. 500 termos   61. 4 termos
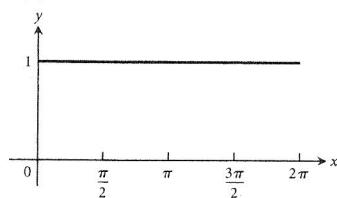
63. (a) $x + \dfrac{x^3}{6} + \dfrac{3x^5}{40} + \dfrac{5x^7}{112}$, raio de convergência = 1

(b) $\dfrac{\pi}{2} - x - \dfrac{x^3}{6} - \dfrac{3x^5}{40} - \dfrac{5x^7}{112}$
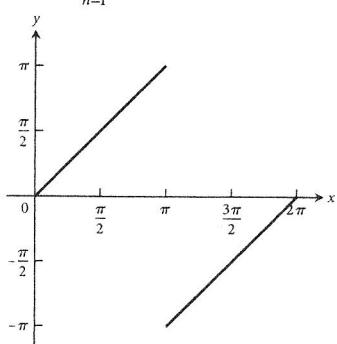
65. $1 - 2x + 3x^2 - 4x^3 + \cdots$ 71. (c) $3\pi/4$

Seção 11.11

1. $f(x) = 1$

3. $f(x) = \displaystyle\sum_{n=1}^{\infty} \frac{2(-1)^{n+1} \operatorname{sen}(nx)}{n}$

5. $\dfrac{e^{2\pi} - 1}{\pi}\left(\dfrac{1}{2} + \displaystyle\sum_{n=1}^{\infty} \frac{\cos(nx)}{n^2 + 1} - \sum_{n=1}^{\infty} \frac{n\operatorname{sen}(nx)}{n^2 + 1}\right)$