Sequências Infinitas

1. Nos seguintes problemas determinar se a sequencias convergem ou divergem. Se convergem determinar o limite.

1. $\left\{\dfrac{n}{2n+1}\right\}$
2. $\left\{\dfrac{2n-1}{n+3}\right\}$
3. $\left\{\dfrac{n-4}{n^2+2}\right\}$
4. $\left\{\dfrac{n^2+1}{3n(n+2)}\right\}$
5. $\left\{\dfrac{1}{1+n^2}\right\}$
6. $\left\{\dfrac{1}{e^n}\right\}$
7. $\{\sqrt{5}\}$
8. $\left\{\dfrac{(n-1)(n+1)}{2n^2+2n+2}\right\}$
9. $\left\{\dfrac{20n}{1+\sqrt{n}}\right\}$
10. $\left\{\dfrac{6-n^{3/2}}{(\sqrt{n}+1)^2}\right\}$
11. $\left\{\dfrac{3+(-1)^n\sqrt{n}}{n+2}\right\}$
12. $\{(-1)^n \sin n\}$
13. $\left\{\sqrt{1+\dfrac{1}{n}}\right\}$
14. $\left\{1+\dfrac{(-1)^n}{2^n}\right\}$
15. $\left\{\cos\left(\dfrac{n-1}{n^2}\right)\right\}$
16. $\left\{\dfrac{n+1}{n}\right\}$
17. $\left\{\dfrac{n^{3/2}+2}{2n^{3/2}}\right\}$
18. $\left\{\dfrac{e^n-e^{-n}}{e^n+e^{-n}}\right\}$
19. $\left\{\dfrac{1}{n}-\dfrac{1}{n+1}\right\}$
20. $\left\{\dfrac{2^n}{5^{n+2}}\right\}$
21. $\{\sqrt{n+1}-\sqrt{n}\}$
22. $\left\{\dfrac{\cos^2 n}{n}\right\}$
23. $\left\{\dfrac{\sqrt{2n^2+1}}{n}\right\}$
24. $\left\{\tan^{-1}\left(\dfrac{n+2}{2}\right)\right\}$
25. $\left\{n\cdot\sin\dfrac{\pi}{2n}\right\}$
26. $\left\{\ln\dfrac{n^2+1}{(n+2)(n+3)}\right\}$
27. $\left\{\left(1+\dfrac{1}{n}\right)^n\right\}$
28. $\left\{\left(1-\dfrac{1}{n}\right)^n\right\}$

2. Nos exercícios 29-33 use a definição de limite para provar que $\lim\limits_{n\to\infty} a_n = L$

29. $a_n = \dfrac{3}{n}$; $L = 0$
30. $a_n = \dfrac{1}{2n+1}$; $L = 0$
31. $a_n = \dfrac{n}{3n+1}$; $L = \dfrac{1}{3}$
32. $a_n = \dfrac{3n-1}{n+1}$; $L = 3$
33. $a_n = \dfrac{n^2+2n+3}{1+n^2}$; $L = 1$

3. Determinar os limites das seguintes sequencias:

1. $\lim\limits_{n\to\infty} n\sin\left(\dfrac{2}{n}\right)$
2. $\lim\limits_{n\to\infty} \dfrac{\sin^3 n}{n}$
3. $\lim\limits_{n\to\infty} \sqrt[n]{4n}$
4. $\lim\limits_{n\to\infty} \dfrac{\ln(n)}{\sqrt{n}}$
5. $\lim\limits_{n\to\infty} (n+1)e^{-n}$
6. $\lim\limits_{n\to\infty} \dfrac{n}{e^n}$
7. $\lim\limits_{n\to\infty} \dfrac{n^n}{n!}$
8. $\lim\limits_{n\to\infty} n^{3/n}$
9. $\lim\limits_{n\to\infty} (n+\pi)^{1/n}$
10. $\lim\limits_{n\to\infty} \left(1-\dfrac{3}{n}\right)^n$
11. $\lim\limits_{n\to\infty} \dfrac{3^n}{(n+3)!}$
12. $\lim\limits_{n\to\infty} \left(\dfrac{e}{n}\ln\dfrac{e}{n}\right)$
13. $\lim\limits_{n\to\infty} \dfrac{n^2\ln(n)}{2^n}$
14. $\lim\limits_{n\to\infty} n^{\sin(\pi/n)}$
15. $\lim\limits_{n\to\infty} \left(\dfrac{n+3}{n}\right)^n$
16. $\lim\limits_{n\to\infty} \left(1+\dfrac{1}{n^2}\right)^n$
17. $\lim\limits_{n\to\infty} \sqrt[n]{n^3}$
18. $\lim\limits_{n\to\infty} \dfrac{n-\sin n}{n+\cos n}$

Séries Infinitas

1. Escreva os quatro primeiros termos das seguintes séries

1. $\sum_{k=1}^{\infty} \frac{\cos \pi k}{2^k}$
2. $\sum_{k=1}^{\infty} \frac{\sqrt{k} \sin \pi k}{k+1}$
3. $\sum_{k=1}^{\infty} \frac{2^k+1}{3^k+2}$
4. $\sum_{k=0}^{\infty} \tan\left(\frac{\pi k}{3}\right)$
5. $\sum_{k=1}^{\infty} \ln\left(\frac{k}{k+1}\right)$
6. $\sum_{k=1}^{\infty} k^k$

2. Determine a convergência das seguintes series. Se convergem determinar a sua soma.

7. $\sum_{k=0}^{\infty} \frac{1}{7^k}$
8. $\sum_{k=1}^{\infty} \frac{1}{3^k}$
9. $\sum_{k=0}^{\infty} 4^k$
10. $\sum_{k=1}^{\infty} \frac{7^k+3^k}{5^k}$
11. $\sum_{k=0}^{\infty} \frac{2^{2k}}{3^{3k}}$
12. $\sum_{k=2}^{\infty} \frac{-1}{3^k}$
13. $\sum_{k=0}^{\infty} \frac{1}{(2+x)^k}, \quad |x| < 1$
14. $\sum_{k=2}^{\infty} \frac{1}{k(k+1)}$
15. $\sum_{k=1}^{\infty} \left[\frac{1}{k+2} - \frac{1}{k+1}\right]$
16. $\sum_{k=2}^{\infty} \frac{2^{k+1}+2\cdot 7^k}{9^k}$
17. $\sum_{k=1}^{\infty} \cos \pi k$
18. $\sum_{k=2}^{\infty} \frac{1}{k^2-1}$
19. $\sum_{k=1}^{\infty} \frac{1}{k^2+5k+6}$
20. $\sum_{k=4}^{\infty} \frac{1}{k^2-9}$
21. $\sum_{k=1}^{\infty} \ln\left(\frac{k}{k+1}\right)$
22. $\sum_{k=1}^{\infty} \frac{2^{k-2}+3^{k+1}}{5^k}$
23. $\sum_{k=0}^{\infty} \frac{2^{k/2}}{3^k}$
24. $\sum_{k=1}^{\infty} \frac{3^k}{3^{k/2}}$

3. Nos exercícios 25 - 30 escrever a fração decimal com (a) uma série infinita (b) o quociente de dois inteiros.

25. $0.333\overline{3}\ldots$
26. $0.777\overline{7}\ldots$
27. $0.929\overline{292}\ldots$
28. $0.32151\overline{515}\ldots$
29. $0.412412\overline{412}\ldots$
30. $0.021343\overline{434}\ldots$

4. Nos exercícios 31-34 utilize o teorema sobre a convergência da série geométrica para comprovar as seguintes igualdades:

31. $\sum_{k=0}^{\infty} (-1)^k x^k = \frac{1}{1+x}$ if $|x| < 1$
32. $\sum_{k=0}^{\infty} x^{2k} = \frac{1}{1-x^2}$ if $|x| < 1$
33. $\sum_{k=0}^{\infty} \frac{x^k}{y^k} = \frac{y}{y-x}$ if $|x| < |y|$
34. $\sum_{k=1}^{\infty} x^k = \frac{x}{1-x}$ if $|x| < 1$.

5. Use o Teste da integral para determinar a convergência ou não das seguintes séries.

1. $\sum \frac{1}{2k+1}$
2. $\sum \frac{1}{(3k+1)^2}$
3. $\sum \frac{1}{k \cdot \ln k}$
4. $\sum \frac{1}{k(\ln k)^2}$
5. $\sum \frac{1}{1+k^2}$
6. $\sum k^2 e^{-k^3}$

6. Nos exercícios de 7-12 utilize o teste da comparação para estabelecer a convergência ou não das seguintes séries

7. $\sum \frac{1}{1+k^2}$

8. $\sum \frac{1}{k^{1/2}+k^{3/2}}$

9. $\sum \frac{\sqrt{k}}{1+k^3}$

10. $\sum \frac{\sqrt{k}}{1+k}$

11. $\sum \frac{3}{\sqrt{k}+2}$

12. $\sum (k-1)e^{-k}$

7. Nos exercícios 13-16 use o teste do limite para determinar a convergência ou divergência das series:

13. $\sum \frac{k+3}{2k^2+1}$

14. $\sum \frac{k^2-4}{k^3+k+5}$

15. $\sum \frac{k+\sqrt{k}}{k+k^3}$

16. $\sum \frac{2k+2}{\sqrt{k^3+2}}$

8. Nos exercícios 17-46 determinar a convergência ou divergência das séries e explicitar o teste utilizado.

17. $\sum \frac{1}{\sqrt{k+1}}$

18. $\sum \frac{\cos^2 \pi k}{k^2}$

19. $\sum \frac{k+1}{k}$

20. $\sum \frac{k(k+1)}{(k+2)(k^2+1)}$

21. $\sum k^2 e^{-k^3}$

22. $\sum \cos\left(\frac{\pi k}{4}\right)$

23. $\sum \frac{2k^2+3k-1}{k^4-6k+10}$

24. $\sum \frac{\sin(\pi k)}{k}$

25. $\sum \frac{2^k}{3^k+1}$

26. $\sum \frac{\tan^{-1} k}{1+k^2}$

27. $\sum \frac{k}{\sqrt{1+k^2}}$

28. $\sum \frac{k^2-2}{k^2+2}$

29. $\sum \frac{1}{\sqrt{4k(k+1)}}$

30. $\sum \frac{2k+2}{\sqrt{k^3+2}}$

31. $\sum \frac{1}{\sqrt[3]{k^2+2k}}$

32. $\sum \frac{k+1}{2\ln k}$

33. $\sum \frac{\ln k}{k}$

34. $\sum \frac{\tan^{-1} k}{k^2}$

35. $\sum \frac{k+1}{\sqrt{k^{3/2}+1}}$

36. $\sum \frac{\ln k}{1+\ln k}$

37. $\sum \frac{\ln(k+1)}{k+2}$

38. $\sum \frac{k}{1+k^2}$

39. $\sum \frac{n^2}{n^3+1}$

40. $\sum \frac{n^2+3}{2n^4+n-6}$

41. $\sum \frac{\ln n}{n^3}$

42. $\sum \frac{3^k}{k+7}$

43. $\sum \frac{2k^2}{\sqrt{k^3+5}}$

44. $\sum \frac{k+3}{(k+2)2^k}$

45. $\sum \frac{\sqrt{k}}{\cos(2k-6)+k^2}$

46. $\sum \frac{\tan^{-1}\sqrt{k}}{\pi+6k^2}$

9. Idem para os exercicios 1-20

1. $\sum \frac{2^k}{k+2}$

2. $\sum \frac{k3^k}{(k+1)!}$

3. $\sum k^{10}e^{-k}$

4. $\sum \frac{k!}{2^{k+2}}$

5. $\sum \frac{\ln k}{e^k}$

6. $\sum \frac{(3k)!}{(k!)^3}$

7. $\sum \frac{k+2}{1+k^3}$

8. $\sum \left(\frac{k}{2k+1}\right)^k$

9. $\sum \frac{1}{(\ln k)^k}$

10. $\sum \frac{k!}{k^k}$

11. $\sum \left(1+\frac{2}{k}\right)^k$

12. $\sum \left(\frac{k}{k+1}\right)^k$

13. $\sum \frac{3^k}{k^3 2^{k+2}}$

14. $\sum \frac{k^3 2^{k+3}}{2^{2k}}$

15. $\sum \frac{(k!)^2}{(3k)!}$

16. $\sum \left(\frac{k}{1+k^3}\right)^k$

17. $\sum \frac{(k+2)!}{4!k!2^k}$

18. $\sum \frac{1}{(k+1)!}$

19. $\sum \frac{k!}{e^{3k}}$

20. $\sum \frac{1}{k\sqrt{\ln k}}$

10. Nos exercícios 21-24 encontrar os valores de $x > 0$ para os quais a série converge.

21. $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots = \sum_{k=0}^{\infty} \frac{x^k}{k!}$ $(0! = 1)$

22. $1 + x^2 + x^4 + \cdots = \sum_{k=0}^{\infty} x^{2k}$

23. $1 + \frac{x^2}{2} + \frac{x^4}{4} + \cdots = 1 + \sum_{k=1}^{\infty} \frac{x^{2k}}{2k}$

24. $1 + \frac{x^2}{2} + \frac{x^4}{3} + \cdots = \sum_{k=0}^{\infty} \frac{x^{2k}}{k+1}$

11. Nos exercícios de 1-30 verifique se a série: (a) converge absolutamente (b) converge condicionalmente

1. $\sum_{k=1}^{\infty} \frac{(-1)^k}{k^3}$

2. $\sum_{k=1}^{\infty} \frac{(-1)^k}{2k+1}$

3. $\sum_{k=1}^{\infty} \frac{(-1)^{k+1}k^2}{(k+2)!}$

4. $\sum_{k=2}^{\infty} (-1)^{k+1} \frac{k}{\ln k}$

5. $\sum_{k=1}^{\infty} (-1)^k \frac{k!}{(2k+1)!}$

6. $\sum_{k=1}^{\infty} \frac{(-k)^3}{3^k}$

7. $\sum_{k=1}^{\infty} \frac{(-1)^k}{1+\sqrt{k}}$

8. $\sum_{k=1}^{\infty} \frac{\cos \pi k}{k}$

9. $\sum_{k=1}^{\infty} \frac{\sin\left(\frac{\pi k}{2}\right)}{k}$

10. $\sum_{k=1}^{\infty} \frac{(-1)^k}{\sqrt{k(k+2)}}$

11. $\sum_{k=1}^{\infty} \frac{(-1)^k \cdot k^3}{2^{k+2}}$

12. $\sum_{k=2}^{\infty} \frac{k^2(-1)^{k+1}}{\ln k}$

13. $\sum_{k=2}^{\infty} \frac{k^2(-1)^{k+1}}{\ln k}$

14. $\sum_{k=1}^{\infty} \frac{(2k+1)(-1)^k}{6k+2}$

15. $\sum_{k=1}^{\infty} \frac{(-1)^k\sqrt{k}}{k+1}$

16. $\sum_{k=1}^{\infty} \frac{(-1)^{k+1}2^k}{k^3 \cdot 3^{k+2}}$.

17. $\sum_{k=2}^{\infty} \frac{(-1)^k}{k \ln^2 k}$

18. $\sum_{k=1}^{\infty} \frac{(-1)^{k+1}k!}{6^k}$

19. $\sum_{k=1}^{\infty} \frac{(-1)^k}{1+k^2}$

20. $\sum_{k=1}^{\infty} \sin\left(\frac{k\pi}{4}\right)$

21. $\sum_{k=2}^{\infty} \frac{(-1)^k k}{\ln \sqrt{k}}$

22. $\sum_{k=1}^{\infty} \frac{(-1)^k k^2}{(2k+1)(k+3)}$

23. $\sum_{k=1}^{\infty} \frac{(-1)^k \sinh k}{3e^{2k}}$

24. $\sum_{k=1}^{\infty} \frac{(-1)^k \tan^{-1} k}{\sqrt{k}}$

25. $\sum_{k=1}^{\infty} \frac{\cos \pi k}{k+2}$

26. $\sum_{k=2}^{\infty} \frac{(-1)^k}{\sqrt[k]{\ln k}}$

27. $\sum_{k=2}^{\infty} \frac{k \sin\left[\frac{(2k+1)\pi}{2}\right]}{\sqrt{1+e^{\sqrt{k}}}}$

28. $\sum_{k=2}^{\infty} \frac{(-1)^k(k^{3/2}+3k)}{7-k^2+2k^{5/2}}$

29. $\sum_{k=1}^{\infty} \frac{\sinh k - \cosh k}{k}$

30. $\sum_{k=2}^{\infty} \frac{(-1)^k \cosh 2k}{ke^k}$

12 Nos exercícios 31-34 determinar os valores de x para os quais a série converge absolutamente.

31. $\sum_{k=0}^{\infty} \frac{x^k}{k!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$

32. $\sum_{k=0}^{\infty} \frac{x^k}{2k+1} = 1 + \frac{x}{3} + \frac{x^2}{5} + \cdots$

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

34. $\sum_{k=0}^{\infty} (-1)^k \frac{x^{2k}}{(2k)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$

Séries de Potências

1. Nos exercícios 1-35 encontrar o intervalo de convergência das seguintes séries de potências:

1. $\sum_{k=0}^{\infty} \frac{x^k}{k+2}$
2. $\sum_{k=1}^{\infty} \frac{x^k}{2k}$
3. $\sum_{k=0}^{\infty} \frac{(-1)^{k+1}}{k!} x^k$
4. $\sum_{k=0}^{\infty} \frac{2^k x^k}{(k+1)!}$
5. $\sum_{k=1}^{\infty} \frac{(k^2+1)}{k!} x^k$
6. $\sum_{k=0}^{\infty} \frac{k \cdot x^k}{2^k}$
7. $\sum_{k=2}^{\infty} \frac{x^k}{\ln k}$
8. $\sum_{k=1}^{\infty} \frac{(-1)^k e^k}{k^2} x^k$
9. $\sum_{k=1}^{\infty} \frac{\cos \pi k}{1+k} x^k$
10. $\sum_{k=1}^{\infty} \frac{(2k+1)!}{2k!} x^{2k}$
11. $\sum_{k=1}^{\infty} \frac{(-1)^k}{k(k+1)} x^k$
12. $\sum_{k=1}^{\infty} k^2 c^k x^k$
13. $\sum_{k=1}^{\infty} \frac{(-1)^k}{k!} (x-3)^k$
14. $\sum_{k=1}^{\infty} \frac{k}{3^k} (x-\pi)^k$
15. $\sum_{k=0}^{\infty} k!(x-1)^k$
16. $\sum_{k=1}^{\infty} \frac{3^k}{k^2} (2x-1)^k$
17. $\sum_{k=2}^{\infty} \frac{(-1)^k}{\ln k} (3x-2)^k$
18. $\sum_{k=2}^{\infty} \frac{1}{(\ln k)^k} (x-1)^k$
19. $\sum_{k=1}^{\infty} \frac{1}{k+2} x^{2k+1}$
20. $\sum_{k=1}^{\infty} \frac{(x+2)^k}{(k+1)3^k}$
21. $\sum_{k=1}^{\infty} \frac{(x-3)^k}{k(k+1)}$
22. $\sum_{k=0}^{\infty} \frac{x^{2k+1}}{\pi^k}$
23. $\sum_{k=1}^{\infty} \frac{k(x-2)^k}{e^k}$
24. $\sum_{k=0}^{\infty} \frac{(2x+5)^k}{\sqrt{2k+8}}$
25. $\sum_{k=2}^{\infty} \frac{k(7x+1)^k}{2^k}$
26. $\sum_{k=1}^{\infty} \frac{(x-2)^k}{3^k \cdot k^2}$
27. $\sum_{k=3}^{\infty} kx^k$
28. $\sum_{k=1}^{\infty} \frac{x^k}{\ln(k+1)}$
29. $\sum_{k=1}^{\infty} \frac{(x-1)^k}{3^k \sqrt{k+1}}$
30. $\sum_{k=0}^{\infty} \frac{(2x-1)^k}{5^k}$
31. $\sum_{k=1}^{\infty} \frac{(k+4)x^k}{(k+1)(k+2)e^k}$
32. $\sum_{k=0}^{\infty} \frac{k^3(x-2)^k}{3^k}$
33. $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{2(k+1)!}$
34. $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{(2k)!}$
35. $\sum_{k=1}^{\infty} \frac{x^k}{k(k+1)}$

2. Utilize a representação da série geométrica para obter uma representação em séries de potências para as seguintes funções. Determine o raio de convergência.

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

3. Nos exercícios de 11-19 encontrar uma representação por séries de potencias das seguintes funções. Determinar o raio de convergência.

11. $f(x) = \dfrac{2}{(1+x)^2}$ $\left(\textit{Hint: } f(x) = -2\dfrac{d}{dx}\left(\dfrac{1}{1+x}\right).\right)$

12. $f(x) = \dfrac{2}{(1-x)^3}$ $\left(\textit{Hint: } f(x) = \dfrac{d^2}{dx^2}\left(\dfrac{1}{1-x}\right).\right)$

13. $f(x) = \dfrac{x}{(1+x^2)^2}$

14. $f(x) = \dfrac{1-x^2}{(1+x^2)^2}$ $\left(\textit{Hint: } f(x) = \dfrac{d}{dx}\left(\dfrac{x}{1+x^2}\right).\right)$

15. $f(x) = \dfrac{1+x^2}{(1-x^2)^2}$

16. $f(x) = \dfrac{1}{(1+4x)^2}$

17. $f(x) = -\dfrac{8x}{(1+4x^2)^2}$ (*Hint:* Use Exercise 3.)

18. $f(x) = \dfrac{1+2x-x^2}{(1+x^2)^2}$ (*Hint:* Use Exercise 8.)

19. $f(x) = \dfrac{2}{(x+1)^2}$ (*Hint:* Use Exercise 7.)

4. Nos exercícios 20-27 encontrar uma representação por séries de potências para as seguintes funções. Utilizar o teorema sobre integração de séries de potências. Determinar o raio de convergência.

20. $f(x) = \ln(1+x)$

21. $f(x) = \ln(1-x)$

22. $f(x) = x\ln(1+x)$

23. $f(x) = \tan^{-1}(2x)$

24. $x\tan^{-1}x$

25. $\ln(4+x)$

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

27. $\ln(1+x^2)$

5. Utilize os resultados dos exercícios 20 e 21 para mostrar que:

28.
$$\ln\left(\frac{1+x}{1-x}\right) = 2\left(x + \frac{x^3}{3} + \frac{x^5}{5} + \cdots\right) \qquad |x| < 1.$$

6. Para a série de potências:

29.
$$\sum_{k=0}^{\infty}(-1)^k\frac{x^{2k}}{(2k)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$$

(a) use o teste da razão para mostrar que a série converge absolutamente $\forall x$.

(b) utilize o teorema da diferenciação de séries de potencias para mostrar que a função $f(x) = \sum_{k=0}^{\infty}(-1)^k\frac{x^{2k}}{(2k)!}$ satisfaz $f^{(n)}(x) = -f(x)$.

(c) Mostre que $f(0) = 1$

(d) Que funções já foram vistas que satisfazem (b) e (c)?

7. Nos exercícios 1-18 encontrar as séries de Taylor ou Maclaurin em torno do ponto c dado para as seguintes funções. Determine os valores de x para os quais a série converge.

1. $f(x) = e^{2x}, \quad c = 0$
2. $f(x) = \sin x, \quad c = 0$
3. $f(x) = \cos x, \quad c = \pi/4$
4. $f(x) = \sin x, \quad c = \pi/6$
5. $f(x) = 1 + x^2, \quad c = 2$
6. $f(x) = \dfrac{1}{1+x}, \quad c = 0$
7. $f(x) = \ln(3 + x), \quad c = 0$
8. $f(x) = x \sin 2x, \quad c = 0$
9. $f(x) = 2^x, \quad c = 0$
10. $f(x) = (1 + x)^n, \quad c = 0$
11. $f(x) = (1 + x)^{3/2}, \quad c = 0$
12. $f(x) = \sqrt{x}, \quad c = 4$
13. $f(x) = \sqrt{x + 1}, \quad c = 0$
14. $f(x) = \dfrac{1}{x}, \quad c = 2$
15. $f(x) = \dfrac{\sin x}{x}, \quad c = 0$
16. $f(x) = x^2 e^{-x}, \quad c = 0$
17. $f(x) = x \sin x, \quad c = \pi/4$
18. $f(x) = x^2 \ln(1 + x), \quad c = 0$

8. Nos exercícios 27-32 utilize a série de Taylor para aproximar as seguintes quantidades com erro inferior a 0.0001.

27. $\sin 2°$
28. e^2
29. $\ln(1.1)$
30. $\displaystyle\int_0^{\pi/4} \sin x^2 \, dx$
31. $\displaystyle\int_0^{1/2} \frac{1}{1 + x^3} \, dx$
32. $\displaystyle\int_0^{1} e^{-x^2} \, dx$