Cálculo 2 - Lista 3

Séries: Teste da Razão e da Raiz

Use o teste da razão ou a análise de $\lim_{n\to\infty} a_n$ para verificar a convergência ou não das séries

1. $\sum_{n=1}^{\infty} \frac{3n-1}{\sqrt{2}^n}$

2. $\sum_{n=1}^{\infty} \frac{2.5.8...(3n-1)}{1.5.9....(4n-3)}$

3. $\sum_{n=1}^{\infty} \frac{n}{2^n+1}$

   Use o teste da raiz ou a análise de $\lim_{n\to\infty} a_n$ para verificar a convergência ou não das séries

4. $\sum_{n=1}^{\infty} \left(\frac{n+1}{2n-1}\right)^n$

5. $\sum_{n=1}^{\infty} \left(\frac{n}{3n-1}\right)^{2n-1}$

   Verifique se as séries a seguir convergem ou não. Use os testes da comparação, da razão, da raiz, ou a análise de $\lim_{n\to\infty} a_n$

6. $\sum_{n=1}^{\infty} \frac{1}{n!}$

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

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

9. $\sum_{n=1}^{\infty} \frac{n^2}{2n^2+1}$

10. $\sum_{n=1}^{\infty} \frac{n}{n^2+1}$

11. $\sum_{n=1}^{\infty} \frac{2n+1}{(n+1)^2(n+2)^2}$

12. $\sum_{n=1}^{\infty} \left(\frac{3n}{3n+1}\right)^n$

13. $\sum_{n=1}^{\infty} \left(\frac{2n+1}{3n+1}\right)^{\frac{n}{2}}$

14. $\sum_{n=1}^{\infty} \frac{n^3}{e^n}$

15. $\sum_{n=1}^{\infty} \frac{2^{n-1}}{n^n}$

16. $\sum_{n=1}^{\infty} \frac{n!}{2^n+1}$

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

18. $\sum_{n=1}^{\infty} \frac{1.3.5.\,...\,.(2n-1)}{4.8.12.\,...\,.4n}$

19. $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}$

20. $\sum_{n=1}^{\infty} \frac{1000.1002.1004....(998+2n)}{1.4.7.....(3n-2)}$

21. $\frac{2}{1} + \frac{2\cdot5\cdot8}{1\cdot5\cdot9} + \frac{2\cdot5\cdot8\cdot11\cdot14\cdots(6n-7)(6n-4)}{1\cdot5\cdot9\cdot13\cdot17\cdots(8n-11)(8n-7)}$

22. $\sum_{n=1}^{\infty} \arcsin \frac{1}{\sqrt{n}}$

23. $\sum_{n=1}^{\infty} \sin \frac{1}{n^2}$

24. $\sum_{n=1}^{\infty} \ln(1 + \frac{1}{n})$

25. $\sum_{n=1}^{\infty} \ln \frac{n^2+1}{n^2}$

26. $\sum_{n=2}^{\infty} \frac{1}{\ln n}$

27. $\sum_{n=1}^{\infty} \frac{1}{n^2-n}$

28. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n(n+1)}}$

29. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n(n+1)(n+2)}}$

30. $\sum_{n=1}^{\infty} \frac{1}{n\sqrt[3]{n}-\sqrt{n}}$

31. $\sum_{n=1}^{\infty} \frac{\sqrt[3]{n}}{(2n-1)(5\sqrt[3]{n}-1)}$

32. $\sum_{n=1}^{\infty} \frac{n!}{n^n}$

33. $\sum_{n=1}^{\infty} \frac{2^n n!}{n^n}$

34. $\sum_{n=1}^{\infty} \frac{3^n n!}{n^n}$

35. $\sum_{n=1}^{\infty} \frac{1000^n}{n!}$

36. $\sum_{n=1}^{\infty} \frac{(n!)^2}{2^{n^2}}$

37. $\frac{1000}{1} + \frac{1000 \cdot 1001}{1 \cdot 3} + \frac{1000 \cdot 1001 \cdot 1002}{1 \cdot 3 \cdot 5} + \cdots$

38. $\frac{4}{2} + \frac{4 \cdot 7}{2 \cdot 6} + \frac{4 \cdot 7 \cdot 10}{2 \cdot 6 \cdot 10} + \cdots$

39. $\sum_{n=1}^{\infty} (\sqrt{2} - \sqrt[3]{2})(\sqrt{2} - \sqrt[5]{2}) \cdots$
$\cdots (\sqrt{2} - \sqrt[2n+1]{2})$

40. $\sum_{n=1}^{\infty} \frac{n^2}{(2+\frac{1}{n})^n}$

41. $\sum_{n=1}^{\infty} \frac{1}{\sqrt[n]{\ln n}}$

42. $\sum_{n=1}^{\infty} \frac{n^3}{2^n + 3^n}$

Respostas:

1. converge
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40. converge
41. diverge
42. converge