9.6 Q's

Tuesday, April 28, 2015 2:07 PM

9.6 Exercises

See CalcChat.com for tutorial help and worked-out solutions to odd-numbered exercises.

Verifying a Formula In Exercises 1–4, verify the formula.

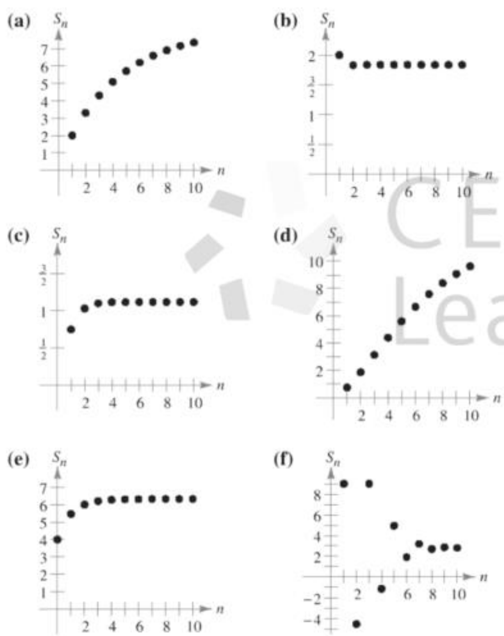
1. $\dfrac{(n+1)!}{(n-2)!} = (n+1)(n)(n-1)$

2. $\dfrac{(2k-2)!}{(2k)!} = \dfrac{1}{(2k)(2k-1)}$

3. $1 \cdot 3 \cdot 5 \cdot \cdot \cdot (2k-1) = \dfrac{(2k)!}{2^k k!}$

4. $\dfrac{1}{1 \cdot 3 \cdot 5 \cdot \cdot \cdot (2k-5)} = \dfrac{2^k k!(2k-3)(2k-1)}{(2k)!}, \quad k \geq 3$

Matching In Exercises 5–10, match the series with the graph of its sequence of partial sums. [The graphs are labeled (a), (b), (c), (d), (e), and (f).]



5. $\sum_{n=1}^{\infty} n\left(\frac{3}{4}\right)^n$

6. $\sum_{n=1}^{\infty} \left(\frac{3}{4}\right)^n\left(\frac{1}{n!}\right)$

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

8. $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}4}{(2n)!}$

9. $\sum_{n=1}^{\infty} \left(\frac{4n}{5n-3}\right)^n$

10. $\sum_{n=0}^{\infty} 4e^{-n}$

Numerical, Graphical, and Analytic Analysis In Exercises 11 and 12, (a) verify that the series converges, (b) use a graphing utility to find the indicated partial sum S_n and complete the table, (c) use a graphing utility to graph the first 10 terms of the sequence of partial sums, (d) use the table to estimate the sum of the series, and (e) explain the relationship between the magnitudes of the terms of the series and the rate at which the sequence of partial sums approaches the sum of the series.

n	5	10	15	20	25
S_n					

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

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

Using the Ratio Test In Exercises 13–34, use the Ratio Test to determine the convergence or divergence of the series.

13. $\sum_{n=1}^{\infty} \frac{1}{5^n}$

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

15. $\sum_{n=0}^{\infty} \frac{n!}{3^n}$

16. $\sum_{n=0}^{\infty} \frac{2^n}{n!}$

17. $\sum_{n=1}^{\infty} n\left(\frac{6}{5}\right)^n$

18. $\sum_{n=1}^{\infty} n\left(\frac{7}{8}\right)^n$

19. $\sum_{n=1}^{\infty} \frac{n}{4^n}$

20. $\sum_{n=1}^{\infty} \frac{5^n}{n^4}$

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

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

23. $\sum_{n=0}^{\infty} \frac{(-1)^n 2^n}{n!}$

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

25. $\sum_{n=1}^{\infty} \frac{n!}{n3^n}$

26. $\sum_{n=1}^{\infty} \frac{(2n)!}{n^5}$

27. $\sum_{n=0}^{\infty} \frac{e^n}{n!}$

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

29. $\sum_{n=0}^{\infty} \frac{6^n}{(n+1)^n}$

30. $\sum_{n=0}^{\infty} \frac{(n!)^2}{(3n)!}$

31. $\sum_{n=0}^{\infty} \frac{5^n}{2^n+1}$

32. $\sum_{n=0}^{\infty} \frac{(-1)^n 2^{4n}}{(2n+1)!}$

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

34. $\sum_{n=1}^{\infty} \frac{(-1)^n[2 \cdot 4 \cdot 6 \cdot \cdot \cdot (2n)]}{2 \cdot 5 \cdot 8 \cdot \cdot \cdot (3n-1)}$