11.7 Exercises

1–38 Test the series for convergence or divergence.

C, comp, geo **1.** $\sum_{n=1}^{\infty} \frac{1}{n+3^n}$

C, ratio **2.** $\sum_{n=1}^{\infty} \frac{(2n+1)^n}{n^{2n}}$

C, comp, p series **11.** $\sum_{n=1}^{\infty} \left(\frac{1}{n^3}+\frac{1}{3^n}\right)$

C, LCT, p series **12.** $\sum_{k=1}^{\infty} \frac{1}{k\sqrt{k^2+1}}$

D, div test **3.** $\sum_{n=1}^{\infty} (-1)^n \frac{n}{n+2}$

C, AST **4.** $\sum_{n=1}^{\infty} (-1)^n \frac{n}{n^2+2}$

C, ratio **13.** $\sum_{n=1}^{\infty} \frac{3^n n^2}{n!}$

C, abs, comp **14.** $\sum_{n=1}^{\infty} \frac{\sin 2n}{1+2^n}$

C, ratio **5.** $\sum_{n=1}^{\infty} \frac{n^2 2^{n-1}}{(-5)^n}$

D, comp, p series **6.** $\sum_{n=1}^{\infty} \frac{1}{2n+1}$

C, ratio **15.** $\sum_{k=1}^{\infty} \frac{2^{k-1}3^{k+1}}{k^k}$

D, LCT, p series **16.** $\sum_{n=1}^{\infty} \frac{n^2+1}{n^3+1}$

D, int **7.** $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$

D, ratio **8.** $\sum_{k=1}^{\infty} \frac{2^k k!}{(k+2)!}$

C, ratio **17.** $\sum_{n=1}^{\infty} \frac{1\cdot 3\cdot 5\cdot \cdots \cdot (2n-1)}{2\cdot 5\cdot 8\cdot \cdots \cdot (3n-1)}$

C, ratio **9.** $\sum_{k=1}^{\infty} k^2 e^{-k}$

C, ratio **10.** $\sum_{n=1}^{\infty} n^2 e^{-n^3}$

C, comp **18.** $\sum_{n=2}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}-1}$

C, AST **19.** $\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{\sqrt{n}}$

C, LCT, 1/k^{7/6} **20.** $\sum_{k=1}^{\infty} \frac{\sqrt[3]{k}-1}{k(\sqrt{k}+1)}$

*C, AST **29.** $\sum_{n=1}^{\infty} \frac{(-1)^n}{\cosh n}$

C, AST **30.** $\sum_{j=1}^{\infty} (-1)^j \frac{\sqrt{j}}{j+5}$

D, div test **21.** $\sum_{n=1}^{\infty} (-1)^n \cos(1/n^2)$

D, div test **22.** $\sum_{k=1}^{\infty} \frac{1}{2+\sin k}$

D, LCT, (5/4)^k **31.** $\sum_{k=1}^{\infty} \frac{5^k}{3^k+4^k}$

*D, ratio **32.** $\sum_{n=1}^{\infty} \frac{(n!)^n}{n^{4n}}$

D, LCT, 1/n **23.** $\sum_{n=1}^{\infty} \tan(1/n)$

D, div test **24.** $\sum_{n=1}^{\infty} n\sin(1/n)$

*C, ratio **33.** $\sum_{n=1}^{\infty} \left(\frac{n}{n+1}\right)^{n^2}$

D, comp, 1/(2n) **34.** $\sum_{n=1}^{\infty} \frac{1}{n+n\cos^2 n}$

C, AST **25.** $\sum_{n=1}^{\infty} \frac{n!}{e^{n^2}}$

C, ratio **26.** $\sum_{n=1}^{\infty} \frac{n^2+1}{5^n}$

*D, LCT, 1/n **35.** $\sum_{n=1}^{\infty} \frac{1}{n^{1+1/n}}$

*C, comp, 1/n^2 **36.** $\sum_{n=2}^{\infty} \frac{1}{(\ln n)^{\ln n}}$

C, ELCT, 1/k^{3/2} **27.** $\sum_{k=1}^{\infty} \frac{k\ln k}{(k+1)^3}$

C, int **28.** $\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$

*C, root **37.** $\sum_{n=1}^{\infty} (\sqrt[n]{2}-1)^n$

*D, LCT, 1/n **38.** $\sum_{n=1}^{\infty} (\sqrt[n]{2}-1)$