

Determine whether the following infinite series converge or diverge. Indicate which test you used and show all work.

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

2) $\sum_{n=0}^{\infty} \frac{5^n}{2^{n+2}}$

3) $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n}$

4) $\sum_{n=1}^{\infty} \frac{n^2 - 10}{4n^5 + n^3}$

5) $\sum_{n=1}^{\infty} \frac{\ln n}{n^3}$

6) $\sum_{n=0}^{\infty} \frac{1-6^n}{8^n}$

7) $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{\sqrt{n^3 + 2n + 1}}$

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

Use the Root or Ratio test to determine if the following are convergent or divergent (or if test is inconclusive).

9) $\sum_{n=0}^{\infty} \frac{n^2 2^{n+1}}{3^n}$

10) $\sum_{n=1}^{\infty} \frac{2^n}{n!}$

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

12) $\sum_{n=2}^{\infty} \frac{1}{(\ln n)^n}$

Use the basic comparison or limit comparison test to determine if the following series converge or diverge. Indicate the function you used for comparison.

13) $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$

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

15) $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2 + 2}$

Use the Integral test to determine if the following series converge or diverge.

16) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

17) $\sum_{n=1}^{\infty} \frac{n}{n^2 + 1}$

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