

SERIES PRACTICE

Does each series converge or diverge? What test would you use to show this? Find the sum of the series when easily possible with our current methods.

1) $\sum_{n=1}^{\infty} \frac{1}{n^{1.1}}$

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

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

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

5) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{\sqrt{n^3 + 1}}$

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

7) $\sum_{n=1}^{\infty} \frac{5 + \sin n}{n}$

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

9) $\sum_{n=1}^{\infty} \frac{\tan^{-1} n}{n^4}$

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

11) $\sum_{n=1}^{\infty} \frac{n \ln n}{(n+1)^4}$

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

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

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

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

16) $\sum_{n=1}^{\infty} \frac{n^2}{5(n+1)(n+3)}$

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

18) $\sum_{n=1}^{\infty} \frac{3}{5^n - e^n}$

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

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

21) $\sum_{n=2}^{\infty} \frac{\ln n}{n^{3/2}}$

22) $\sum_{n=1}^{\infty} \frac{3n^2 - \sqrt{n}}{\sqrt{2n^5 - n} + 8}$

23) $\sum_{n=1}^{\infty} \frac{1 + \cos n}{3^n}$

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

25) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{2^{5n}}{5^{2n+1}}$

26) $\sum_{n=1}^{\infty} \frac{\sqrt{n} + n}{3n^2 + 4}$

27) $\sum_{n=3}^{\infty} \frac{\cos(n\pi)}{n-2}$

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

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

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

ANSWERS

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|-------|---------------------------------------|-----------------------------|
| 1) C | 2) C, sum is $\frac{3}{4}$ | 3) C, sum is 25 |
| 4) D | 5) C | 6) D |
| 7) D | 8) D | 9) C |
| 10) C | 11) C | 12) C |
| 13) D | 14) D | 15) D |
| 16) D | 17) C, sum is $\frac{-1}{e^2(e^2+1)}$ | 18) C |
| 19) D | 20) C | 21) C |
| 22) D | 23) C | 24) D |
| 25) D | 26) D | 27) C |
| 28) C | 29) D | 30) C, sum is $1 - \cos(1)$ |