



Determine whether the series is convergent or divergent

$$1. \sum_{n=1}^{\infty} \frac{4 + 3^n}{2^n}$$

Use comparison test

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

Use alternating series divergence test

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

Use Ratio test

$$4. \sum_{n=1}^{\infty} \frac{1}{n + 3^n}$$

Use comparison test

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

Use Root test

$$6. \sum_{n=1}^{\infty} n^2 e^{-n^3}$$

Use Integral test

$$7. \sum_{n=2}^{\infty} \sin n$$

Use test of divergence

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

Use Limit Comparison test

$$9. \sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{n \ln n}$$

Use Alternating Series test

$$10. \sum_{k=1}^{\infty} \frac{k + 5}{5^k}$$

Use Ratio test



11. 
$$\sum_{n=1}^{\infty} \left(-\frac{n}{5}\right)^n$$

Use test of divergence of alternating series

12. 
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{n^3 + 4}$$

Use alternating series test

13. 
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n^4}$$

Use Absolute convergence and integral test

14. 
$$\sum_{n=1}^{\infty} \frac{n^2 + 1}{5^n}$$

Use the Ratio test

15. 
$$\sum_{n=1}^{\infty} \frac{n^2 - 1}{3n^4 + 1}$$

Use Comparison test

16. 
$$\sum_{n=2}^{\infty} \left(\frac{-2n}{n+1}\right)^{5n}$$

Use the Root test

17. 
$$\sum_{k=1}^{\infty} \frac{k \ln k}{(k+1)^3}$$

Use Integral test test and comparison test

18. 
$$\sum_{n=1}^{\infty} \left(\sqrt[n]{2} - 1\right)$$

Use Limit comparison test with  $a_n = \sqrt[n]{2}$  and  $b_n = 1/n$ 

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

Use Root test

$$20. \sum_{n=1}^{\infty} \left( \frac{n^2 + 1}{2n^2 + 1} \right)^n$$

Use Root test

$$21. \sum_{n=2}^{\infty} \frac{\sqrt{n}}{n-1}$$

Use Comparison test

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

Use Root test

$$23. \sum_{n=1}^{\infty} \frac{1}{n^4} \sin\left(\frac{n\pi}{2}\right)$$

Use Absolute convergence and integral tests

$$24. \sum_{n=1}^{\infty} \frac{10^n}{(n+1)4^{2n+1}}$$

Use the Ratio test

$$25. \sum_{n=3}^{\infty} \frac{n+2}{(n+1)^3}$$

Use the Limit comparison test with  $a_n = \frac{n+2}{(n+1)^3}$  and  $b_n = \frac{1}{n^2}$

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

Use Alternating series test

Convergent