

WORKSHEET: STRATEGY FOR TESTING SERIES

Determine if the series converges or diverges. If it converges, indicate if the convergence is conditional or absolute.

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

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

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

12. $\sum_{n=1}^{\infty} \left(1 - \frac{1}{\sqrt[3]{n}}\right)^n$ (CHALLENGING)

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

13. $\sum_{n=1}^{\infty} \left[\ln\left(\frac{en}{n+1}\right)\right]^n$

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

14. $\sum_{n=2}^{\infty} \frac{n^{\ln n}}{(\ln n)^n}$ (HARD)

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

15. $\sum_{n=1}^{\infty} n^{-2} e^{\frac{1}{n}}$

6. $\sum_{n=2}^{\infty} \ln\left(\frac{n^2}{n^2-1}\right)$

16. $\sum_{n=1}^{\infty} \frac{n+9^n}{e^{n^2+1}}$

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

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

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

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

9. $\sum_{n=1}^{\infty} (\sqrt[n]{3} - 1)^n$

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

10. $\sum_{n=1}^{\infty} (-1)^n (\sqrt[n]{3} - 1)$ (HARD)