

AP Calculus BC

Infinite Series

Alternating Series

Name _____

Determine the convergence or divergence of the series.

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

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

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

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

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

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

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

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

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

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

11. $\sum_{n=1}^{\infty} \sin\left[\frac{(2n-1)\pi}{2}\right]$

12. $\sum_{n=1}^{\infty} \cos(n\pi)$

13. $\sum_{n=1}^{\infty} \frac{1}{n} \cos(n\pi)$

14. $\sum_{n=1}^{\infty} \frac{1}{n} \sin\left[\frac{(2n-1)\pi}{2}\right]$

15. $\sum_{n=0}^{\infty} \frac{(-1)^n}{n!}$

16. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!}$

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

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

Approximate the sum of the series by using the first 6 terms.

$$19. \sum_{n=1}^{\infty} \frac{(-1)^{n+1} 3}{n^2}$$

$$20. \sum_{n=1}^{\infty} \frac{(-1)^{n+1} 4}{\ln(n+1)}$$

$$21. \sum_{n=0}^{\infty} \frac{(-1)^n 2}{n!}$$

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

How many terms are needed to approximate the sum of the convergent series with an error less than .001.

$$23. \sum_{n=0}^{\infty} \frac{(-1)^n}{n!} = \frac{1}{e}$$

$$24. \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} = \sin 1$$

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

$$26. \sum_{n=0}^{\infty} \frac{(-1)^n}{2^n n!} = \frac{1}{\sqrt{e}}$$

Determine whether the series converges conditionally, converges absolutely, or diverges.

$$27. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{(n+1)^2}$$

$$28. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n+1}$$

$$29. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n}}$$

$$30. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n\sqrt{n}}$$

$$31. \sum_{n=1}^{\infty} \frac{(-1)^{n+1} n^2}{(n+1)^2}$$

$$32. \sum_{n=1}^{\infty} \frac{(-1)^{n+1} (2n+3)}{n+10}$$

$$33. \sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{\ln n}$$

$$34. \sum_{n=0}^{\infty} (-1)^{n+1} e^{-n^2}$$

$$35. \sum_{n=1}^{\infty} \frac{(-1)^n}{n^3 - 1}$$

$$36. \sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n+4}}$$

$$37. \sum_{n=0}^{\infty} \frac{\cos(\pi n)}{n+1}$$

$$38. \sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n^2}$$

Find the values of p for which this series converges

$$39. \sum_{n=1}^{\infty} (-1)^n \left(\frac{1}{n^p} \right)$$

$$40. \sum_{n=1}^{\infty} (-1)^n \left(\frac{1}{n+p} \right)$$