AP Calculus BC

Infinite Series

Alternating Series

Name _____

Determine the convergence or divergence of the series.

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

Converges

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

Diverges

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

Converges

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

Diverges

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

Converges

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

Converge

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

Converges

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

Diverges

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

Diverges

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

Converges

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

Diverges

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

Diverges

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

Converges

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

Converges

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

Converges

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

Converges

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

Converges

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

Diverges

Approximate the sum of the series by using the first 6 terms. Determine the accuracy of the approximation.

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

2.4325, .0612

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

2.7067, 1.0236

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

.07333, .002778

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

.1875,.05469

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

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

n=6; 7 terms

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

n=2; 3 terms

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

n=1000; 1000 terms

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

n=4; 5 terms

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

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

Converges Absolutely

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

Converges Conditionally

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

Converges Conditionally

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

Converges Absolutely

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

Diverges

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

Diverges

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

Converges Conditionally

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

Converges Absolutely

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

Converges Absolutely

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

Converges Conditionally

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

Converges Conditionally

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

Converges Absolutely

Find the values of p for which this series converges

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

p>0

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

Converges for all p