

Watch. Practice. Understand. | Lesson 340

Calculus BC 10.4 Alternating Series Test and Absolute Convergence Theorem

Watch the matching video: <https://www.youtube.com/watch?v=PyRgZjEcD5g>

Practice focus: Alternating series and absolute convergence

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

01 Determine absolute/conditional convergence of $\sum (-1)^{n+1}/n$, $n \geq 1$.

02 Classify $\sum (-1)^n/n^2$, $n \geq 1$.

03 How many terms guarantee error at most 0.01 for the alternating harmonic series?

04 Why does $\sum (-1)^n/n$ fail the alternating series test and diverge?

Worked answers | Lesson 340

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01 Determine absolute/conditional convergence of $\sum (-1)^{n+1}/n$, $n \geq 1$.

Alternating terms decrease to 0, so it converges. Absolute series is harmonic and diverges: conditional convergence.

02 Classify $\sum (-1)^n/n^2$, $n \geq 1$.

Absolute series $\sum 1/n^2$ converges; therefore absolutely convergent.

03 How many terms guarantee error at most 0.01 for the alternating harmonic series?

Error $\leq 1/(N+1)$. Require $1/(N+1) \leq 0.01$, giving $N \geq 99$ terms.

04 Why does $\sum (-1)^n n$ fail the alternating series test and diverge?

Term magnitudes grow, and signed terms do not approach 0. The term test already proves divergence.