

Series Convergence

Conjectures

Resolve these conjectures with proofs or disproofs.

If one is false but has an easy fix, state the fix and prove it.

- 1) If $\sum a_n$ converges, then $na_n \rightarrow 0$.
- 2) If $na_n \rightarrow 0$, then $\sum a_n$ converges.
- 3) If $\sum a_n$ converges, then $\sum (a_n)^2$ converges.
- 4) If $\sum (a_n)^2$ converges, then $\sum a_n$ converges.
- 5) If $a_n \geq 0$ and $\sum a_n$ converges, then $\sum \sqrt{a_n}$ converges.
- 6) If $a_n \geq 0$ and $\sum \sqrt{a_n}$ converges, then $\sum a_n$ converges.
- 7) If $\sum a_n$ converges, then $\sum \frac{a_n}{n}$ converges.
- 8) If $a_n \geq 0$ and $\sum a_n$ converges, then $\sum \frac{\sqrt{a_n}}{n}$ converges.
- 9) Suppose $\sum a_n$ and $\sum b_n$ are strictly alternating series and $|b_n| \geq |a_n|$ for all n .
If $\sum b_n$ converges, then $\sum a_n$ converges.