Pf: Let $s_n = a_1 + \cdots + a_n$

The series converges iff $\{s_n\}$ is a Cauchy seq

iff $\forall \varepsilon > 0 \; \exists N < \infty$

s.t. for all $n \geq N, k \geq 0$,

$$|s_{n+k} - s_{n-1}| < \varepsilon$$

Equivalently, iff $\forall n \geq N, k \geq 0$

$$|a_n + a_{n+1} + \cdots + a_{n+k}| < \varepsilon.$$