

Sum of product

Prove that if $a_n, b_n > 0$ with $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ convergent, then $\sum_{n=1}^{\infty} a_n b_n$ converges.

Note: This shows as a corollary that if $\sum_{n=1}^{\infty} a_n$ is convergent, so is $\sum_{n=1}^{\infty} a_n^2$.