

Suppose $\{\mathbf{a}_k\}$ is a sequence in \mathbb{R}^n satisfying

$$|\mathbf{a}_{k+1} - \mathbf{a}_k| \leq \frac{1}{2} |\mathbf{a}_k - \mathbf{a}_{k-1}|, \quad k > 1.$$

Prove that the sequence converges.