Problem 1: Limit of a Sequence

Let x_n be the sequence of real numbers recursively defined by $x_0 = 0, x_1 = 1$ and $x_{n+1} = \frac{1}{n+1}x_n + (1 - \frac{1}{n+1})x_{n-1}$ for $n \geq 1$. Show that x_n converges and determine $\lim_{n\to\infty} x_n$

As always, show your work, fully explain and justify your answer. A solution mainly obtained by computers or calculators will not be accepted.

Posting Date 1/11/2020. Submit solutions to Noah Aydin, Mathematics Department, RBH 319 (e-mail or hard-copy, but hard copy submissions must include a time stamp) by noon on 1/19/2020.