Question #15204 Prove that the sequence $\{a_n\}_{n\geq 1}$ defined by $a_n = \dfrac{3n+7}{4n+8}$ is a monotonic sequence.

Solution. One has that for $n \geq 2$, $a_n - a_{n-1} = \dfrac{3n+7}{4n+8} - \dfrac{3n+4}{4n+4} = \dfrac{1}{4}\left(\dfrac{(3n+7)(n+1)-(3n+4)(n+}{(n+2)(n+1)}\right.$ $\dfrac{3n^2+10n+7-3n^2-10n-8}{4(n+2)(n+1)} = -\dfrac{1}{4(n+2)(n+1)}$, thus $\{a_n\}_{n\geq 1}$ is strictly decreasing sequence,