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**Abstract**

Here we find a general method for computing the limit of differences of consecutive terms of  $n$ th roots of weighted factorials by a sequence  $x_n$  (under some technical condition). As a consequence, we show that  $\lim_{n \rightarrow \infty} \left( \sqrt[n+1]{(n+1)!x_{n+1}} - \sqrt[n]{n!x_n} \right) = \alpha e^{-1}$ , where  $\alpha \geq 1$  is the dominant root of the characteristic equation of an increasing linear sequence  $x_n$ , and  $e$  is Euler's constant.