The Reverse Ultra Log-Concavity of the Boros-Moll Polynomials

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Abstract: We prove the reverse ultra log-concavity of the Boros-Moll polynomials. We further establish an inequality which implies the log-concavity of the sequence $\{i!d_i(m)\}$ for any $m \geqslant 2$, where $d_i(m)$ are the coefficients of the Boros-Moll polynomials $P_m(a)$. This inequality also leads to the fact that in the asymptotic sense, the Boros-Moll sequences are just on the borderline between ultra log-concavity and reverse ultra log-concavity. We propose two conjectures on the log-concavity and reverse ultra log-concavity of the sequence $\{d_{i-1}(m)d_{i+1}(m)/d_i(m)^2\}$ for $m \geqslant 2$.

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