

Extension of irreducibility results on generalized Laguerre polynomials $L_n^{(-n-s-1)}(x)$

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Abstract. Let n be a positive integer. We consider the irreducibility of generalized Laguerre polynomials of the form

$$L_n^{(-n-s-1)}(x) = \sum_{j=0}^n (-1)^j \binom{n+s-j}{n-j} \frac{x^j}{j!}.$$

For different values of s , this family gives polynomials which are of great interest. It was proved earlier that for $0 \leq s \leq 60$, these polynomials are irreducible over \mathbb{Q} , and their Galois groups are shown to be A_n or S_n . In this paper, we prove that $L_n^{(-n-s-1)}(x)$ is irreducible for each $s \leq 92$. Also, we prove that $L_n^{(-n-s-1)}(x)$ has no linear factor for each $93 \leq s \leq 100$. Furthermore, assuming the irreducibility of $L_n^{(-n-s-1)}(x)$ for $93 \leq s \leq 100$, we determine that the Galois group of $L_n^{(-n-s-1)}(x)$ is either A_n or S_n for each $61 \leq s \leq 100$.

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