

ON THE DERANGEMENT-FIBONACCI POLYNOMIALS AND NUMBERS

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ABSTRACT

The generating function of derangement polynomials $D_n(x)$ is defined by

$$\frac{e^{-t}}{1-t} e^{xt} = \sum_{n=0}^{\infty} D_n(x) \frac{t^n}{n!} \quad (1)$$

for $n \in \mathbb{N}_0$ in [1].

When $x = 0$ is written in Equation (1), the derangement numbers D_n are obtained [1, 2].

In this study, derangement polynomials and derangement numbers are defined by means of Fibonacci coefficients. The generating functions of these polynomials and numbers are derived, and explicit formulas are obtained. Furthermore, several fundamental properties, including derivative and integral formulas, are established within the framework of Golden calculus. The results provide new insights into the interplay between derangement theory and Fibonacci coefficients and contribute to the development of Fibonacci-based special polynomial families.

Keywords Derangement polynomials, · Fibonacci numbers · Golden calculus

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