Helmut Prodinger
Two Families of Series for the Generalized Golden Ratio,
Fibonacci Quart. **53** (2015), no. 1, 74–77.

Abstract

Higher order Fibonacci numbers have the characteristic equation $X^n - X^n - \cdots - X - 1 = 0$, where $n = 2$ means the classical case. Special interest is in $\alpha = \alpha_n$, the dominant (=largest, positive) root of this equation, which is the golden ratio for $n = 2$.

Letting $\beta = \beta_n = 1/\alpha_n$, then, as $n \to \infty$, $\alpha_n \to 2$, and $\beta_n \to \frac{1}{2}$. In this paper, series expansions of $(2 - \alpha)^r$ and $(\beta - \frac{1}{2})^r$ are obtained for arbitrary exponents r. This extends results recently obtained in [2].