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Closed Forms for Certain Fibonacci Type Sums That Involve Second Order Products,

Fibonacci Quart. **55** (2017), no. 3, 195–200.

Abstract

In this paper, we present closed forms for certain finite sums in which the summand is a product of generalized Fibonacci numbers. We present our results in the form of six theorems that feature a generalized Fibonacci sequence $\{W_n\}$, and an accompanying sequence $\{\overline{W}_n\}$. We add a further layer of generalization to our results with the use of three parameters s , k , and m .

The inspiration for this paper comes from a website of Knott that lists so-called *order 2 summations* involving the Fibonacci and Lucas numbers. Probably the most well-known of these summations is

$$\sum_{i=1}^n F_i^2 = F_n F_{n+1}.$$