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Proof and Generalization of the Cassini-Catalan-Tagiuri-Gould Identities,

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Abstract

The only published proof of the Gould identity which generalizes the Tagiuri, Catalan, and Cassini identities is based on exploration of general properties of a functional operator. In this paper we present a simply described method, the Tagiuri Generation Method (TGM), which can both generate and prove an infinite number of identities in an arbitrary number of parameters. In particular TGM generates and proves the Gould identity. This paper explores TGM and looks at one infinite family of identities generated by TGM. The identities that result from TGM are different from traditional Fibonacci identities in that indices of Fibonacci numbers occurring in these identities seem uniformly distributed. The paper makes this heuristic precise. Two open problems connected with TGM are also presented.