1002-05-69 **Curtis Greene** and **Herbert S. Wilf*** (`wilf@math.upenn.edu`), Dept. of Mathematics, University of Pennsylvania, Philadelphia, PA 19104-6395. *Closed form summation of C-finite sequences.*

Suppose $\{F(n)\}$ is a sequence that satisfies a recurrence with constant coefficients whose associated polynomial equation has distinct roots. Consider a sum of the form

$$\sum_{j=0}^{n-1}(F(a_1 n + b_1 j + c_1)F(a_2 n + b_2 j + c_2)\ldots F(a_k n + b_k j + c_k)).$$

We prove that such a sum always has a closed form in the sense that it evaluates to a polynomial with a fixed number of terms, in the values of the sequence $\{F(n)\}$. We explicitly describe two different sets of monomials that will form such a polynomial, and give an algorithm for finding these closed forms, thereby completely automating the solution of this class of summation problems. We exhibit tools for determining when these explicit evaluations are unique of their type, and prove that in a number of interesting cases they are indeed unique. (Received August 24, 2004)

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