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Christopher D Sinclair* (sinclair@math.ubc.ca), Department of Mathematics, The University of British Columbia, Room 121, 1984 Mathematics Road, Vancouver, BC V6T1Z2, Canada. *Special functions and the range of multiplicative functions on $\mathbb{Z}[x]$.*

Mahler's measure is generalized to create the class of *multiplicative distance functions*. These functions measure the complexity of polynomials based on the location of their zeros in the complex plane. To each multiplicative distance function we associate two families of analytic functions which encode information about its range on $\mathbb{C}[x]$ and $\mathbb{R}[x]$. These *moment functions* are Mellin transforms of distribution functions associated to the multiplicative distance function and demonstrate a great deal of arithmetic structure. As an example of this we will demonstrate that the moment functions associated to the equilibrium potential of a family of ellipses of capacity 1 turn out to be rational functions with coefficients which are either rational or rational times a power of π . Moreover the poles of these functions are at positive and negative integers, and each of these functions has a high multiplicity zero at the origin. As a practical application of this theory we give asymptotic estimates for the number of reciprocal polynomials of fixed degree with Mahler measure less than T as $T \rightarrow \infty$. (Received September 21, 2005)