SOME ELLIPTICAL INTEGRALS ASSOCIATED WITH HYPERGEOMETRIC FUNCTIONS

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Abstract: The main object of this paper is to establish seven elliptical integrals associated with hypergeometric functions and suggest new way to compute their numerical values. The results presented in this article are presumably new and not present in the scientific literature.

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1. Introduction and Definitions

A generalized hypergeometric function $_\alpha F_\beta(a_1, ..., a_\alpha; b_1, ..., b_\beta; z)$ is a function which can be defined in the form of a hypergeometric series, i.e., a series for which the ratio of successive terms can be written as:

$$\frac{c_{\zeta+1}}{c_\zeta} = \frac{P(\zeta)}{Q(\zeta)} = \frac{(\zeta + a_1)(\zeta + a_2)...(\zeta + a_\alpha)}{(\zeta + b_1)(\zeta + b_2)...(\zeta + b_\beta)(\zeta + 1)} \; z. \tag{1.1}$$

Where $\zeta + 1$ in the denominator is present for historical reasons of notation (see [1]; [6], p. 12 (2.9)), and the resulting generalized hypergeometric function is written