

## SOME SUMMATION FORMULAS FOR THE HYPERGEOMETRIC SERIES ${}_{r+2}F_{r+1}\left(\frac{1}{2}\right)$

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Received 16:06:2011 : Accepted 22:06:2012

### Abstract

The aim of this paper is to obtain explicit expressions of the generalized hypergeometric function

$${}_{r+2}F_{r+1} \left[ \begin{matrix} a, b, \\ \frac{1}{2}(a+b+j+1), \end{matrix} \begin{matrix} (f_r+m_r) \\ (f_r) \end{matrix} ; \frac{1}{2} \right]$$

for  $j = 0, \pm 1, \dots, \pm 5$ , where  $r$  pairs of numeratorial and denominatorial parameters differ by positive integers  $m_r$ . The results are derived with the help of an expansion in terms of a finite sum of  ${}_2F_1\left(\frac{1}{2}\right)$  functions and a generalization of Gauss' second summation theorem due to Lavoie *et al.* [J. Comput. Appl. Math. **72**, 293–300 (1996)]. Some special and limiting cases are also given.

**Keywords:** Generalized hypergeometric series, Generalized Gauss summation theorem

*2000 AMS Classification:* Primary 33C20, Secondary 33C15

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