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On certain transformation formulae for q-series

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Abstract: In this paper, making use of Ramanujan's ${}_1\Psi_1$ summation formulae and some known transformation formulae for ${}_2\Psi_1$ series, we have established certain interesting transformation formulae for q-series.

Key words and phrases: q-series, basic hypergeometric series, basic bilateral hypergeometric series, transformation formula, summation formula, continued fraction and q-series identity.
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1. Introduction, Notations and Definitions

Throughout this paper, we shall adopt following notations and definitions.
For any number α and q real or complex and $|q| < 1$,
Let

$$[\alpha; q]_n = (1-\alpha)(1-\alpha q)...(1-\alpha q^{n-1}), \quad n > 0$$

$$[\alpha; q]_0 = 1,$$

and

$$[\alpha; q]_\infty = \prod_{r=0}^{\infty}(1-\alpha q^r).$$

Following Gasper and Rahman [2], we define a basic hypergeometric series as,

$${}_r\Phi_s\left[\begin{array}{l} a_1, a_2, ..., a_r; q; z \\ b_1, b_2, ..., b_s \end{array}\right]$$

$$= \sum_{n=0}^{\infty} \frac{[a_1, a_2, ..., a_r; q]_n z^n}{[q, b_1, b_2, ..., b_s; q]_n} \left[(-)^n q^{n(n-1)/2}\right]^{1+s-r}, \tag{1.1}$$

where

$$[a_1, a_2, ..., a_r; q]_n = [a_1; q]_n [a_2; q]_n ... [a_r; q]_n$$