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A NOTE ON ROGER'S FINE IDENTITY

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Abstract: In this paper, making use of Rogers-Fine identity and certain known results, interesting and useful results have been established.

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1. Introduction and Definitions

For q real or complex $|q| < 1$, a basic hypergeometric series is given by

$$ {}_r\Phi_s\left[\begin{array}{l} a_1, a_2, ..., a_r; q; z \\ b_1, b_2, ..., b_s; q^{\lambda} \end{array}\right] = \sum_{n=0}^{\infty} \frac{[a_1, a_2, ..., a_r; q]_n z^n}{[q, b_1, b_2, ..., b_s; q]_n} q^{\lambda n(n-1)/2}, \tag{1.1} $$

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

$$ [a; q]_n = \begin{cases} 1, & \text{if } n = 0, \\ (1-a)(1-aq)(1-aq^2)...(1-aq^{n-1}), & \text{if } n = 1, 2, 3, ... \end{cases} $$

and

$$ [a; q]_\infty = \prod_{r=0}^{\infty} (1 - aq^r). \tag{1.2} $$