

Fractional q -Derivative of Generalized Miller-Ross Function

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Abstract: This paper is devoted to fractional q -derivative of special functions. To begin with the theorem on term by term q -fractional differentiation has been derived. The result is an extension of an earlier result due to Yadav and Purohit [8] As a special case, of fractional q -differentiation of Generalized Miller-Ross function has been obtained.

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Definition

1.1. q -Analogue of Differential Operator

Al-Salam [3], has given the q -analogue of differential operator as

$$D_q f(x) = \frac{f(xq) - f(x)}{x(q-1)} \quad (1.1)$$

This is an inverse of the q -integral operator defined as

$$\int_x^\infty f(t) d(t; q) = x(1-q) \sum_{k=1}^{\infty} q^{-k} f(xq^{-k}) \quad (1.2)$$

where $0 < |q| < 1$.

1.2. Fractional q -Derivative of Order α

The fractional q -derivative of order α is defined as

$$D_{x,q}^\alpha f(x) = \frac{1}{\Gamma_q(-\alpha)} \int_0^x (x-yq)_{-\alpha-1} f(y) d(y; q) \quad (1.2.1)$$