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ON Q-VOLKENBORN INTEGRAL OF SOME P-ADIC ELEMENTARY FUNCTIONS

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ABSTRACT

Let p be a fixed odd prime number. Throughout this paper by $\mathbb{Z}_p, \mathbb{Q}_p$ and \mathbb{C}_p we denote the ring of p -adic integers, the field of p -adic numbers and the completion of the algebraic closure of \mathbb{Q}_p , respectively. Let q be indeterminate with $|1 - q|_p < p^{-\frac{1}{p-1}}$. For $f \in UC(\mathbb{Z}_p \rightarrow \mathbb{C}_p)$, the p -adic q -integral on \mathbb{Z}_p is defined by

$$(1) \quad I_q(f) = \int_{\mathbb{Z}_p} f(x) d\mu_q(x) := \lim_{N \rightarrow \infty} \frac{1}{[p^N]_q} \sum_{j=0}^{p^N-1} f(j)q^j$$

where $[x]_q = \frac{1-(q)^x}{1-q}$ (see [1]). In the present work we study on q -Volkenborn integral for some p -adic elementary functions. Also, we obtain some results for the cases $p = 1$ and $p = -1$.

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