ON NEW IDENTITIES INVOLVING CHROMATIC OVERPARTITIONS

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Abstract: Our basic aim is to provide two new identities involving q-hypergeometric series inspired in some Euler's partitions identities. These are obtained making use of the new concept of chromatic overpartitions explored in this article.

Keywords and Phrases: Integer Partitions; Overpartitions; Chromatic Partitions; Chromatic Overpartitions; Hypergeometric Series.

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1. Introduction

In [16], Schneider and Sills gave new insights about what the called a norm of an integer partition $\lambda = \lambda_1 + \lambda_2 + \ldots + \lambda_k$ of n, denoted by $N(\lambda)$. The norm function is defined by
$N(\lambda) = \lambda_1.\lambda_2 \cdots \lambda_k$ and it is present in several works in combinatorial number theory and additive number theory as in MacMahon [14] dated of 1917 as shows the next result.

For $q \in \mathbb{C}$, and $|q| < 1$,

$$\prod_{k=1}^{n} \frac{1}{1-q^k} = \sum_{\lambda \vdash n} \frac{1}{N(\lambda)m_1!m_2!\ldots(1-q)^{m_1}(1-q^2)^{m_2}\ldots},$$

where $\lambda = \langle 1^{m_1}2^{m_2}3^{m_3}\ldots\rangle$ and $\lambda \vdash n$ means that λ is a partition of n.