IDENTITIES IN ITERATED RASCAL TRIANGLES

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Abstract. In this manuscript we show new binomial identities in iterated rascal triangles. In particular, iterated rascal numbers are closely related to $(1,q)$-binomial coefficients. Finally, we state an open conjecture about the relation between iterated rascal numbers and (p,q)-binomial coefficients.

Contents

1. Definitions

Definition 1.1. *Iterated rascal number*

$$\binom{n}{k}_i = \sum_{m=0}^{i} \binom{n-k}{m}\binom{k}{m} \tag{1.1}$$

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Sources: https://github.com/kolosovpetro/IdentitiesInRascalTriangle

Definition 1.2. $(1,q)$-*Binomial coefficient*

$$\begin{bmatrix} n \\ k \end{bmatrix}^q = \begin{cases} q & \text{if } k = 0, n = 0 \\ 1 & \text{if } k = 0 \\ 0 & \text{if } k > n \\ \begin{bmatrix} n-1 \\ k \end{bmatrix}^q + \begin{bmatrix} n-1 \\ k-1 \end{bmatrix}^q \end{cases} \tag{1.2}$$

2. Introduction

test figure

n/k	0	1	2	3	4	5	6	7
0	1							
1	1	1						
2	1	2	1					
3	1	3	3	1				
4	1	4	5	4	1			
5	1	5	7	7	5	1		
6	1	6	9	10	9	6	1	
7	1	7	11	13	13	11	7	1

Table 1. Rascal triangle generated by $\binom{n}{k}_1$. See the OEIS sequence [1].

3. Conclusions

Conclusions of your manuscript.

References

[1] Sloane, N. J. A. The Rascal triangle read by rows. Entry A077028 in The On-Line Encyclopedia of Integer Sequences, 2002. https://oeis.org/A077028.

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