IDENTITIES IN RASCAL TRIANGLE

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Abstract. Your abstract here.

Contents

1. Definitions

Definition 1.1. *Generalized rascal number*

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

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

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

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2. Introduction

Proposition 2.1. *Generalized rascal triangle number equals to binomial coefficient up to i-th column*

$$\binom{n}{k}_i = \binom{n}{k}, \quad 0 \leq k \leq i \tag{2.1}$$

Thus,

$$\binom{n}{i-k}_i = \binom{n}{i-k}$$

By symmetry of binomial coefficients, we have

$$\binom{n}{n-i+k}_i = \binom{n}{n-i+k}$$

Proposition 2.2. *Generalized rascal number equals to binomial coefficient up to $2i+1$-th row*

$$\binom{n}{k}_i = \binom{n}{k}, \quad 0 \leq n \leq 2i+1$$

Therefore, for every fixed $i \geq 0$

$$\binom{2i+1-j}{k}_i = \binom{2i+1-j}{k} \tag{2.2}$$

Let be $t \geq 2i+1$ then for every fixed $i \geq 0$ follows

$$\binom{t-j}{k}_{t-i-1} = \binom{t-j}{k} \tag{2.3}$$

3. Conclusions

Conclusions of your manuscript.

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