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Review Article

Optimized Technique for Computation of Novel Geometric Series

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Abstract

This paper presents a novel method for computing the innovative geometric series andits summations. First, the great innovative idea for novel geometric series starts from 2 = 2 such as:

$$2 = 2 \Longrightarrow 2 = 1 + 1 \Longrightarrow 2 = 1 + \frac{1}{2} + \frac{1}{2} \Longrightarrow 2 = 1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^3} \Longrightarrow \sum_{i=0}^{3} \frac{1}{2^i} = 2 - \frac{1}{2^3}$$

In this paper, several results of novel geometric series are given for innovative computations.

Keywords: Geometric Progression; Innovative Computation; Novel Geometric Series

Introduction

Computation of Novel geometric series and its summations has an important role in science and technology [1-9] and also in engineering and technology. Technology is a vital tool to fulfill human needs and desires, but geometric series and other mathematical techniques are the building blocks of science and technology. In this paper, novel geometric series are developed toenhance technological skills, for example, algorithms and programs.

Novel geometric series

We commonly know that a finite geometric series is any series that can be written in the following form:

$$a + ax + ax^2 + ax^3 + \cdots + ax^{n-1} = \sum_{i=0}^{n-1} ax^i = \frac{a(x^n - 1)}{x - 1} \quad (1)$$

The new development of finite geometric series is as follows:

$$ax^n = ax^n \Longrightarrow ax^n = a(x-1)x^{n-1} + ax^{n-1} \quad (2)$$
$$\Longrightarrow ax^n = a(x-1)x^{n-1} + a(x-1)x^{n-2} + ax^{n-2} \quad (3)$$
$$\Longrightarrow ax^n = a(x-1)x^{n-1} + a(x-1)x^{n-2} + \cdots + a(x-1)x^k + x^k \quad (4)$$

From (4), we can constitute a new geometric series as follows:

$$ax^k + ax^{k+1} + \cdots ax^{n-2} + ax^{n-1} = \sum_{i=k}^{n-1} ax^i = \frac{a(x^n - x^k)}{x - 1} \quad (5)$$

We can extend the expression (4) as follows:

$$\Longrightarrow axn = a(x-1)xn-1 + a(x-1)xn-2 + \cdots a(x-1)x2 + a(x-1) + a \quad (6)$$

From (6), we can constitute a new geometric series as follows:

$$a + ax + ax^2 + ax^3 + \cdots + a(x-1)x^k + \cdots + ax^{n-1} = \sum_{i=0}^{n-1} ax^i = \frac{a(x^n - 1)}{x - 1} \quad (7)$$

We can extend the expression (6) as follows:

$$\Longrightarrow ax^n = a(x-1)x^{n-1} + a(x-1)x^{n-2} + \cdots a(x-1)x^{-k} + ax^{-k} \quad (8)$$

From (6), we can constitute a new geometric series as follows:

$$ax^{n-1} + ax^{n-2} + \cdots + a + \cdots + ax^{-k} = \sum_{i=-k}^{n-1} ax^i = \frac{a(x^n - x^{-k})}{x - 1} \quad (9)$$

The following is a new geometric series:

$$a = a \Longrightarrow a = a(x-1)x^{-1} + ax^{-1} \Longrightarrow a = a(x-1)x^{-1} + \cdots + a(x-1)x^{-n} + ax^{-n} \quad (10)$$

From (10), we can constitute a new geometric series as follows:

$$a + ax^{-1} + ax^{-2} \cdots + ax^{-n} = a + \frac{a}{x} + \frac{a}{x^2} + \cdots + \frac{a}{x^n} = \sum_{i=1}^{n} ax^{-i} = \frac{a(1 - x^{-n})}{1 - x} \quad (11)$$

$$ax^{-k} = ax^{-k} \Longrightarrow a = a(x-1)x^{-k} + \cdots + a(x-1)x^{-n} + ax^{-n} \quad (12)$$

$$ax^{-k} + ax^{-(K+1)} + \cdots + ax^{-n} = \frac{a}{x^k} + \frac{a}{x^{k+1}} \cdots + \frac{a}{x^n} = \sum_{i=k}^{n} ax^{-i} = \frac{a(x^{-k} - x^{-n})}{1 - x} \quad (13)$$

Conclusion

In this research paper, a computation technique has been introduced for development of a newsummability on addition of multiple geometric series.

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