Expressions of Combinations

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Abstract

The operation Combination is a powerful operation in mathematics. Combination operation as an infinite series with 2n and n result in many mathematical constants. Some of them have been demonstrated in this paper.

Keywords

Combinations, Wolfram, Expressions, Infinite series, constants, π, e, golden ratio, √2, √3, √5√17;

Introduction

Humans have wondered about presence and absence. I have written papers on "Expressions for 1" for presence and "Expressions for 0" for absence. These are very important expressions. In fact, Wikipedia treats 0 and 1 as general mathematical constants.

Advancement from 1 is essentially a combination exercise that a human undergoes. He sees similarity between two things to count as 2 from 1. This is an important thought process of an individual. Another important thing a man realizes is that some things are desirable and some things are not desirable. And the human begins to wonder the world of his as a mixture of these two aspects.

The above thought process of a human is the combination. The combination comb(2n,n) which is also written as $\binom{2n}{n}$.

In this paper I have considered the combination of n and 2n over an infinite series to express the mathematical constants that they give. Indeed, the expression comb(2n,n) or $\binom{2n}{n}$ is very beautiful which gives many mathematical constants.

The expressions for mathematical constants π, e, golden ratio, √2, √3, √5,√17 are obtained.

My special thanks to Wolfram for their brilliant mathematical widget without which these expressions could not have been tested and confirmed for correctness. [1]

The expressions on π

$$\sum_{2}^{inf} \left(\frac{(2^n)}{\binom{2n}{n}}\right) = \pi/2$$

The above expression has been checked in Wolfram alpha.[1]

If we take 1/$\binom{2n}{n}$, (n*n)/ $\binom{2n}{n}$, (n*n*n)/ $\binom{2n}{n}$, (n*n*n*n)/ $\binom{2n}{n}$, ... (n*n*n*n*n*n*n)/ $\binom{2n}{n}$ . . . . . . and so on the result of summation from 0 to infinity is some rational number+some number* π in all the cases. Some snapshots from Wolfram alpha is attached below.[1]

The expression on e

$$\sum_0^{inf}\left(\frac{\binom{2n}{n}}{permutation\ \ (2n,n)}\right) = e$$

The above expression has been checked in Wolfram alpha.[1]

The expression on 1.61803. . . . ., the Golden Ratio

$\frac{1}{2} + 1/2\sum_{0}^{inf}(((5^{n})\binom{2n}{n})) = 1.61803\,.\,.\,.\,.\,.\,.\,.$

The above expression has been checked in Wolfram alpha.[1]

The expressions on irrational numbers of the type √n

$\sum_{0}^{inf}((2^{-3n})\binom{2n}{n}) = \sqrt{2}$

$3/2\sum_{0}^{inf}((4^{-2n})\binom{2n}{n}) = \sqrt{3}$

$\sum_{0}^{inf}((5^{-2n})\binom{2n}{n}) = \sqrt{5}$

$\sum_{0}^{inf}(((17^{-3n})/(34^{-2n}))\binom{2n}{n}) = \sqrt{17}$

The above expression has been checked in Wolfram alpha.[1]

References

[1] https://www.wolframalpha.com/