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Expressions of constants, binomial expressions and prime number generators from Rational Number Series

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Abstract
The author had submitted a paper on 'Rational Number Series'[1]. Over the few months many expressions of mathematical constants, binomial expressions and also prime number generators were developed using the Rational Number series. These expressions are of great importance to the mathematicians. All of these are obtained from the Rational Number Series[1].

Keywords
Expressions, constants, rational number series, binomial expression, prime number generator

Introduction
The expression of the types $(\frac{n}{n+1}-\frac{n-1}{n})$, $\left(\frac{2n+1}{2n+2}-\frac{2n-1}{2n}\right)$ and their variants were termed Rational Number Series [1] . These are also called as three consecutive numbers and four consecutive numbers. These expressions fetch expressions of mathematical constants, binomial expressions and prime number generator. In these paper these are outlined.

Expressions of mathematical constants

$$\sum_{0}^{\infty}\left(\frac{(3n+1)}{(3n+2)}-\frac{3n}{(3n+1)}\right)=\frac{\pi}{3\sqrt{3}}$$

$$\sum_{0}^{\infty}(-1)^n\left(\frac{(3n+2)}{(3n+3)}-\frac{3n}{(3n+1)}\right)=\frac{\pi}{3\sqrt{3}}$$

$$\sum_{p=1}^{\infty}\prod_{1}^{p}\sum_{p}^{\infty}\left(\frac{n}{n+1}-\frac{n-1}{n}\right)=e-1$$

$$\sum_{n=1}^{\infty}(\frac{1}{n}-\int\left(\frac{(n-1)}{n}-\frac{n}{(n+1)}\right)dn)=\gamma$$

$$\sum_{n=1}^{\infty}(\frac{1}{n}-2\int\left(\frac{(2n-1)}{2n}-\frac{(2n+1)}{(2n+2)}\right)dn)=\gamma$$

Binomial Expressions

$$\frac{\frac{(n-1)^k}{n^k}-\frac{n^k}{(n+1)^k}}{\left(\frac{(n-1)}{n}-\frac{n}{(n+1)}\right)^k}=\sum_{m=1}^{k}\binom{k}{m}(-1)^m(n^2)^{k-m}$$

$$\frac{\frac{(2n-1)^k}{2n^k}-\frac{(2n+1)^k}{(2n+2)^k}}{\left(\frac{(2n-1)}{2n}-\frac{(2n+1)}{(2n+2)}\right)^k}=\sum_{m=1}^{k}\binom{k}{m}(-1)^m(2n^2+n)^{k-m}$$

Prime number Generator

$$\frac{(n+3)^2\left(\frac{(n+3)^2}{(n+4)^2}-\frac{(n+2)^2}{(n+3)^2}\right)}{\left(\frac{(n+3)}{(n+4)}-\frac{(n+2)}{(n+3)}\right)^2}+30$$

Which reduces to

$$2n^2+12n+47$$

Is an efficient prime number generator.

Conclusion

All in all expressions of constants, binomial expressions and prime number generator have been obtained from Rational Number Series . The concept of Rational Number Series can be more widely used.

References

1. Kirtivasan Ganesan, *Rational Number Series,* June 2019 http://www.jetir.org/papers/JETIR1907J15.pdf (www.jetir.org (ISSN -2349-5162))