Ramanujan summation of natural numbers.

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Abstract

The summation of natural numbers N =1+2+3+4+… = - 1/12 was introduced by the India's greatest mathematician Ramanujan around 1913. This shocking summation is known by all mathematicians and has now become famous by multimedia. In this paper I used alternative simple solution to justify this summation of natural number.

1. INTRODUCTION

Number theory has been studied for a very long time, and multimedia is now widely used in all fields, but notably in number theory. Ramanujan carried extensive studies while unemployed and under extremely difficult living conditions. Ramanujan was undoubtedly one of the most inventive mathematicians of all time, as demonstrated by his summation derivation approach. Through the use of integration, graphs, and certain limit notions, I want to simplify the solution in this work. I believe the outcome was consistent with the Ramanujan series solution.

2. Ramanujan's summation Explanation by using integration method

Finding the limits that can be utilized to integrate the function and creating the function using arithmetic progression is the first step in my plan to use integration to verify the summations. Additionally, I provide justification for everything I am able to do utilizing the graph notion. integration to verify the summations. Additionally, I provide justification for everything I am able to do utilizing the graph notion.

2.1 The generating functions:

1+2+3+…+ ∞ = sum of all the natural number

As per the Arithmetic Progression equation

1+2+3+…+ ∞ = x(x+1)/2

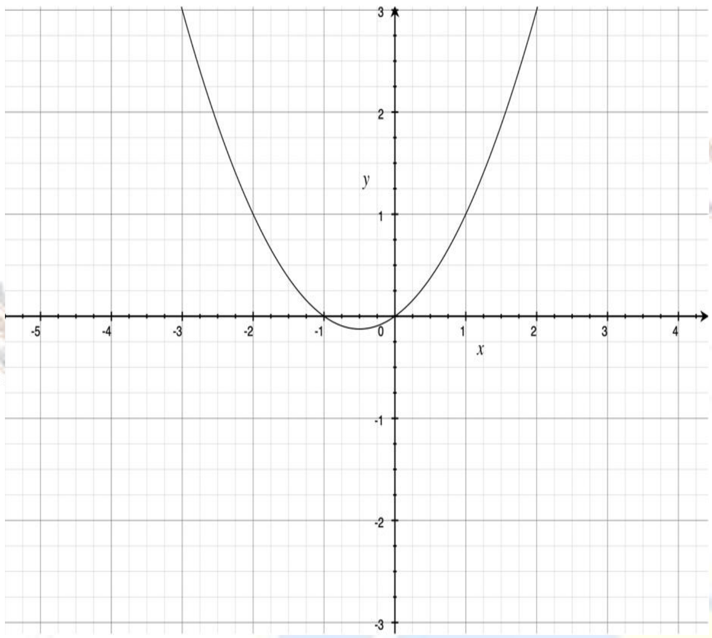
Here x = Number of terms

Took 1+2+3+…+ ∞ = y

Then, y = $\frac{x(x+1)}{2}$

2.2 Declaration of limit of the function 'y':

To solve this function,
If we put x=0 then we got y=0
If we put y=0 then
0=x(x+1)
We got two values of x which are 0 and -1.



N = sum of natural number

$$N = \int_{-1}^{0} \frac{x(x+1)}{2} dx$$

$$= \frac{1}{2}\int_{-1}^{0} x(x+1) dx$$

$$= \frac{1}{2}\int_{-1}^{0} (x^2+x) dx$$

$$= \frac{1}{2}\left[\frac{x^3}{3}+\frac{x^2}{2}\right]_{-1}^{0}$$

$$= \frac{1}{2}\left[0 - \left[\frac{(-1)^3}{3}+\frac{(-1)^2}{2}\right]\right]$$

$$= -\frac{1}{2}\left[-\frac{1}{3}+\frac{1}{2}\right]$$

$$= -\frac{1}{2}\left[-\frac{2+3}{6}\right]$$

$$= -\frac{1}{12}$$

SO, the summation of natural numbers N =1+2+3+4+… = - 1/1 2 was simplify by this method

3.Reference

- G. Anddrews, Number Theory, Dover edition
- R.D. Sharma: table of integrals series and products
- YouTube