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Zero, infinity, and an infinite universe

Abstract: In this paper, giving consideration to the Eilenberg–Mazur swindle, I present an interesting mathematical proof that:

A) Considering infinite (∞) systems, the results of the "Eilenberg–Mazur swindle" which have previously been ignored, cannot be ignored.
B) Systems that can be considered as infinite, such as our universe, can be considered as "non-real".
C) In systems that can be considered as infinite, such as our universe, the number Zero can be taken as an infinite number, which can be considered as either positive or negative.

This surprising and unexpected proof also has other implications, which I discuss in this paper, which affects our reality. This work is, at its very least, an interesting mathematical curiosity. I provide two examples, which reach the same conclusion.

Explanation:
The "Eilenberg–Mazur swindle" is a method of proof that involves infinite sums. It has been found that when working with infinite sums, often "impossible" or "non-real" results are obtained. Due to this, such results are not taken seriously, and are considered as a mathematical fallacy. However, when dealing with systems that we may consider as infinite, such as our universe, such infinite sums cannot be ignored. Refer to example 1.

Example 1:
Suppose we have two observers, observers A and B. These two observers wish to count the number of stars in the universe, one by one. To do this, they decide to divide the universe into two halves. Observer A will count all the stars on his side of the universe, and observer B will count all the stars on his side. They will then add their results together so that the answer will give the number of stars in the universe. If the universe is truly infinite, then each observer arrives at the infinite series U, where U = the number of stars counted by each observer.

Ie:
Let U = 1+1+1+1+1+1+1+1+1+..... (An Infinite series) ……. equation (1

Therefore, the number of stars in the universe = series U + series U.
Thus:

$$\begin{array}{rcl} U & & 1+1+1+1+1+1+1+1+1+1+..... \\ +\ U & = & +\ 1+1+1+1+1+1+1+1+1+1+..... \\ \hline \\ \hline \end{array}$$

adding the bottom to the top gives:

$$\begin{array}{rl} & 1+1+1+1+1+1+1+1+1+1+\ldots\ldots\ldots \\ + & 1+1+1+1+1+1+1+1+1+1+\ldots\ldots\ldots \\ \hline = & 1+1+1+1+1+1+1+1+1+1+\ldots\ldots\ldots \\ \hline \end{array}$$

Thus,

$U + U = U$ ……. equation (2

Subtracting U from both sides of equation 2 gives:

$U = 0$ ……. equation (3

Multiplying both sides of equation 3 by -1 gives us:

$-U = 0$ ……. equation (4

Note that:
$-U = [-1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - \ldots\ldots\ldots]$ …….equation (5

Equation 5 is an infinite negative number.
As shown in equation 1, U is an infinite positive number. Thus, combining equations 1, 3, 4 and 5 gives us:

Series $U = U = -U = 0 = \infty = -\infty$ ……. equation (6

Example 2:
Another such infinite sum example is considered in string theory. **Polchinski, P. (1998)** tells us that if we have the infinite series, let us call it "S", which is shown below, then the sum of this infinite series can be calculated as equal to the odd result of -1/12.

$S = 1+2+3+4+5+6+7+8+9+\ldots\ldots\ldots = -1/12$ …….equation (7

I am interested in a different infinite series, however. Suppose we consider our universe as infinite, and we say that it contains an infinite number of stars. Now, suppose we wanted to count these stars, one by one. As a result, we would end up with infinite series "U", as presented in equation 8 below.

Let $U = 1+1+1+1+1+1+1+1+1+1+\ldots\ldots\ldots$ (An Infinite series) ……. equation (8
(Where U = the number of stars in our universe)

Equation 8 above, thus becomes an important equation, which is the number of stars in our universe. It only holds true if our two assumptions hold true. Ie: that:

Assumptions:

1) Our universe is infinite and;
2) Our universe contains an infinite number of stars.

Normally, we don't deal with infinite sums like equation 8 in our everyday life. The sums we normally deal with are "finite". As a result, we are naturally mentally accustomed to "finite numbers" and "finite thinking", and equations like equation 8 would never be considered or taken seriously, thus would be classified as an "Eilenberg–Mazur swindle". Since the universe could actually be infinite, and could actually contain an infinite number of stars, what would happen if we did take equation 8 seriously? Lets see.

The number of stars in our universe, given previous assumptions 1 and 2:
If the universe is infinite, and assumptions 1 and 2 hold true, we will find ourselves dealing with infinite sums. Therefore, let us consider two sets of infinite series or infinite sums, namely series U and series S, which go on forever. Our main interest in this section, however, is series U.

Let U = 1+1+1+1+1+1+1+1+1+1+..... (An Infinite series) ……. equation (9
Let S = 1+2+3+4+5+6+7+8+9+..... (An Infinite series) …….equation (10

Now, let us determine S –U
Thus:

$$\begin{array}{r} S \\ -U \\ \hline \\ \hline \end{array} = \begin{array}{r} 1+2+3+4+5+6+7+8+9+..... \\ -\left[1+1+1+1+1+1+1+1+1+.....\right] \\ \hline \\ \hline \end{array}$$

Subtracting the bottom from the top gives:

$$= \begin{array}{r} 1+2+3+4+5+6+7+8+9+..... \\ -\left[1+1+1+1+1+1+1+1+1+.....\right] \\ \hline 0+1+2+3+4+5+6+7+8+9+..... \end{array}$$

Thus:

$$= \begin{array}{r} 1+2+3+4+5+6+7+8+9+..... \\ -\left[1+1+1+1+1+1+1+1+1+.....\right] \\ \hline 0+1+2+3+4+5+6+7+8+9+..... \end{array}$$

$$= \begin{array}{r} 1+2+3+4+5+6+7+8+9+..... \\ -\left[1+1+1+1+1+1+1+1+1+.....\right] \\ \hline 0+[1+2+3+4+5+6+7+8+9+.....] \end{array}$$

..... equation (11

Notice that, from equation 11, the result of S-U is also an infinite series, which is equal to Zero plus the infinite series S in equation 10.

Thus:

$$\begin{array}{r} S \\ -U \\ \hline \\ \hline \end{array} = \begin{array}{r} 1+2+3+4+5+6+7+8+9+..... \\ -\left[1+1+1+1+1+1+1+1+1+.....\right] \\ \hline 0+S \end{array}$$

So we can say:

$$S - U = 0 + S \qquad \text{……. equation (12}$$

Subtracting S from both sides gives:

$$S - U - S = 0 + S - S$$
$$-U = 0 \qquad \text{……. equation (13}$$

Multiplying both sides of equation 13 by -1 gives us:

$$U = 0 \qquad \text{……. equation (14}$$

Now, let us consider equation 9. According to equation 9, U is an infinite series, and goes on forever, thus can be considered as an infinite number. Therefore:

U = [1+1+1+1+1+1+1+1+1+1+…….] = a positive infinite number ……. equation (15
Hence:

-U = [-1-1-1-1-1-1-1-1-1-1-…….] = a negative infinite number ……. equation (16

Equations 13 and 14 tell us that:

U = 0 = -U ..... equation (17

Considering equations 15, 16 and 17, we see that:

U = a positive infinite number = 0 ……. equation (18
-U = a negative infinite number = 0 ……. equation (19

Considering equations 9, 18 and 19, we can say:

Series U = U = -U = 0 = ∞ = -∞ ……. equation (20

Discussion:
This result (equations 6 and 20) is normally considered as an "Eilenberg–Mazur swindle", as it involves infinite sums. However, if we take equations 1 and 8, and assumptions 1 and 2 seriously, we can't simply ignore equations 6 and 20, or infinite sums. If the universe is infinite, we will find ourselves dealing with infinite sums, thus we will end up with results like equations 6 and 20.
So, what can the results in equations 6 and 20 mean?

This is a rather surprising result. It would indicate that:

A) That which can be considered as infinite, such as our universe (∞), isn't real (= 0). The fact that we can generate "non-real" results from infinite sums indicates that infinity either does not exist, or that anything that is infinite is "non-real". Our physical reality may be some kind of "simulation", like a video game, if it is infinite.
B) Everything that exists in an infinite universe (∞) can come from nothing (=0), indicating that creation is possible. The reverse must be true also, in that since "nothing" (0) can come from "something" (= ∞), destruction is possible.
C) An infinite universe (∞) is equal to an opposite (-∞). There must therefore be more than one universe if our universe is infinite.

This work, thus statements A, B and C above, support the McMahon field theory (2010). This work is an interesting mathematical curiosity. It is also interesting to note that 0 and ∞ share something else in common. Any number, when divided by itself, is equal to 1, with the exception of 0, +∞ and -∞.

Ie: $+\infty/+\infty = -\infty/-\infty = 0/0$ = undefined.
It is also interesting to note that, according to equations 1 and 20, zero can be considered as a negative or positive value. This work is, at its very least, an interesting mathematical curiosity.

References:

McMahon, C.R. (2010) "*McMahon field theory: Theoretical unification of relativity and quantum physics, thus methods to generate gravity and time."* The general science journal.
Polchinski, P. (1998) *String theory, volume 1, an introduction to the bosonic string*. Cambridge university press. page 22.