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The Beal Conjecture:

A Proof and Counterexamples

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Extract

The Beal Conjecture, $A^x + B^y = C^z$*, is analyzed as of a proof based on selfsame multiples through addition and the presentation of counterexamples. The Beal Conjecture requests the presentation of counterexamples based upon selfsame multiplication, when in fact such counterexamples do not exist. Counterexamples do exist through selfsame addition* $A^x + B^y = z(C)$, *where it is possible to present relations of equivalency that have terms in positive integers with no common prime factor. The analysis in this essay presents an explanation of the equation based upon its stipulated algebraic notation.*

The Beal Conjecture: $A^x + B^y = C^z$

The conjecture $A^x + B^y = C^z$ made by Mr. Andrew Beal is mainly concerned with the ***common prime factor*** for positive integer terms and their exponents. The algebraic notation determines the procedural method of ***selfsame multiplication*** [x^n] of the terms in order to obtain the ***relation of equivalency*** in the cited equation. However, we shall consider the procedural step of obtaining the products of the terms through ***selfsame addition.*** The Beal Conjecture may be approached and resolved through simple addition. In our view, the algebraic notation of the terms and their exponents obfuscates what is actually happening within the equation itself.

The Beal Conjecture requires positive integers in the terms [A, B, C] and in the exponents [x, y, z] of the equation (the latter whose value must be greater than 2). The products of the terms must reflect the *selfsame multiplication* of the terms in whole numbers or positive integers. Obviously, no fractional expressions are to appear in any of the three terms or three exponents of the equation. And, the most significant part of the conjecture affirms the necessity that the terms share a common prime divisor. Or, to the contrary, one must present *counterexamples*.

The terms of the resolutions cited by Professor Mauldin contain terms that are multiples of the primes listed for the common prime divisor. In other words, the terms in the cited examples are either prime numbers or multiples of that particular prime number. Therefore, the redundancy of the statement of equivalency made by each equation is obvious. For example:

$33^5 + 66^5 = 33^6$ = ***Multiples of 11 plus multiples of 11 equal multiples of 11.***

More exactly: *selfsame* multiples of 11 plus *selfsame* multiples of 11 equal *selfsame* multiples of 11.

$34^5 + 51^4 = 85^4$ = ***Multiples of 17 plus multiples of 17 equal multiples of 17.***

More exactly: *selfsame* multiples of 17 plus *selfsame* multiples of 17 equal *selfsame* multiples of 17.

More specifically, and listed respectively as above:

3557763 [11s] plus **113848416 [11s]** equal **117406179 [11s]**

2672672 [17s] plus **397953 [17s]** equal **3070625 [17s]**

Hence, the cited multiples *necessarily* have a common prime divisor, as each term is a multiple of that particular common prime divisor. These same relationships may be viewed inversely as:

11 [3557763s] plus **11 [113848416s]** equal **11 [117406179s]**

17 [2672672s] plus **17 [397953s]** equal **17 [3070625s]**

However, such a view denies the algebraic notation as expressed in terms and exponents (powers).

The equation begins with the terms and the exponents of **selfsame multiplication [x^n]**, but the equation ends with the elementary procedure of adding together the sum of the two products of two of the terms in a comparison of equivalency with the third term. The procedure of addition mediates the terms/exponents *and* the final relation of equivalency.

When such equations exist that have no common prime divisor, then, the terms shall reflect multiples of different primes (or co-primes), inasmuch as a prime is divisible only by 1 and itself without a remainder, and co-primes are divisible only by 1. The third term in a co-prime equation is irrelevant, be it another prime number or a composite number, inasmuch as the presence of two prime numbers (i.e., a co-prime) determines the absence of a common prime factor for the three terms of the equation. When the concept of **selfsame**

Mentally, one may think of the terms and their exponents as the procedure of **selfsame multiplication** as in 7 • 7 • 7 • 7 = 2401. In selfsame multiplication, in this example, the number seven represents both the **multiplicand** and the **multiplier.** This mental visualization, although often employed, does not reflect what is happening, for what occurs in the computation is: 7 • 7 = **49** • 7 = **343** • 7 = **2401.** However, when we view the detail in the multiplication procedure of selfsame multiplication, we see that the multiplier and the multiplicand change in nature with each step. At the level of the first step, seven is both the multiplicand and the multiplier (7•7). At the level of the second step, the number 49 becomes the multiplier and seven is the multiplicand, while at the level of the third step, the number 343 becomes the multiplier and seven the multiplicand.

However, in this case, we simply say that the number/term [x, 7], is being multiplied *by itself* a certain number of times [*n* or 4], where seven is the multiplicand and four is the multiplier in this case [7•7•7•7]. When actually the number seven is being multiplied by itself only *once* and, then after that, it is multiplied against the **products** of each subsequent multiplication step.

Language and notation are important, because they can hide reality from us, where we take for granted measures and procedures that may in fact vary. Even the previously cited procedure may be too abstract, since one is actually treating the **selfsame multiplication** of **7**, **[49, 343, 2401]**, which does not cover all of the selfsame ***multiples*** of seven for that range [1 through 2401]. More comprehensive is the concept of ***selfsame multiples through addition***, [7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, ...n2401], which long preceded the concept of symbolic multiplication in the algebraic notation used today [$\mathbf{x^n}$].

Obviously, ***selfsame multiplication*** represents only a few multiples within the complete range of ***selfsame addition*** of any given number. The selfsame ***addition*** of 7 plus 7 plus 7 plus 7 plus 7 plus... = 2401 represents the complete number of multiples of seven within the range of ***1 through 2401***. In other words, there are **three-hundred-and-forty-three 7s** in the numbers 1 through 2401. One may view the range inversely as ***seven 343s,*** but then the algebraic notation of terms and exponents is no longer adequate for expressing this particular set of multiples. The algebraic notation of terms and exponents of selfsame multiples within Fermat's Last Theorem and the Beal Conjecture reference certain limited selfsame multiples through *multiplication* within the complete range of selfsame multiples through *addition*. *[Consult the initial ranges of the numbers in the charts in the* **Addendum***, where one may see the limited number of selfsame multiples through* ***multiplication*** *within the more complete range of selfsame multiples through* ***addition****.]*

Due to the history of mathematical and algebraic notation, we generally no longer think according to selfsame multiples through addition; nor do we speak in such terms; nor are many textbooks written in this manner. These are levels that are considered to have been long ago surpassed in mathematics and in the

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