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A numerical study of Andrew Beal's Conjecture

G Kesavan Nair
Tc 25/2727(5), pra l 9, luke's lane, puthenchanthai, trivandrum – 695001, Kerala, india.

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Permanent Affiliations:

I worked in the prestigious VIKRAM SARABHAI SPACE CENTRE (VSSC), INDIAN SPACE RESEARCH ORGANOSATION (ISRO), TRIVANDRUM, for 39 years and seven months from 1971 onwards. I was responsible for handling and managing of Main-Frame computers, latest Servers and Workstations and network of the Central Computer Facility in VSSC. I also worked as a designer and programmer in Fortran Language. I designed a set up of Cross-assembler, linkage editor, Simulator, Real-time Executive and Console Service routine all of which were used for the development of an On-Board Computer (bit-Slice) in Main-Frame system in the year 1982-83. The programs for Cross-Assembler and the simulator were written solely by me based on my design.

I was interested in finding a solution for Fermat's Last theorem from 1981 onwards. I was partly successful in 1982. After retirement from office, I could dedicate more time for research. I found two entirely different solutions for the problem – the first one was published in Amazon Kindle direct Publishing (KDP). The second one is a follow up of my solution done in 1982. I published my second proof in the peer reviewed International Journal of Advances in Engineering and Management (IJAEM) with title " A Simple and Elegant Proof for Fermat's Last Theorem" , Volume 2, Issue 5, PP: 866-879, 12-09-2020.

My publications include:

1. Magic Squares – All combinations of 3rd and 4th order. 2012

Print Length: 274 pages Page Numbers Source ISBN: 1469981890
ASIN: B00AENI8LG, Format: Kindle Edition

2. **SUDOKU - the combinations**

Paperback, 280 pages, Published March 30th 2012 by Createspace Independent Publishing Platform, **ISBN** 1475080999

3. Compact AD Calendars for 2500 Years January 2012

Paperback: 32 pages;
Publisher: Createspace Independent Publishing Platform, **ISBN-10:** 1468174886, **ISBN-13:** 978-1468174885

4. EQUATIONS FOR PYTHAGOREAN TRIPLES & Fermat's last Theorem – a new proof, and Andrew Beal's conjecture – proof for special case , Sep 16, 2019. **ISBN-10:** 1693852969, **ISBN-13:** 978-1693852961

ABSTRACT
Andrew Beal's conjecture is a conjecture in number theory. It is a generalization of Fermat's Last theorem which remained unsolved for 350 years and was solved by British mathematician Andrew Wiles in 1995 winning the Wolfskehl prize of $50,000 in 1997.
Proving or disproving Beal's Conjecture will be very rewarding as the prize amount offered is $1 Million! Mathematicians and others are all interested in it. The conjecture states that if $A^x + B^y = C^z$ where A, B, C, x, y, and z are positive integers with x, y, z > 2, then A, B, and C have a common prime factor.
In this paper I conduct a numerical analysis of Beal's Conjecture which will be useful for those trying to solve Beal's Conjecture.
Key words: Andrew Beal's Conjecture; Fermat's Last Theorem.
AMS Subject Classification: 11-XX **Number theory**

INTRODUCTION

Beal's conjecture is a conjecture in number theory. It states that if $A^x + B^y = C^z$ where A, B, C, x, y, and z are positive integers with x, y, z > 2, then A, B, and C have a common prime factor.

Aim:

My numerical study is for a range of values of A, B, C, x, y, and c that are congenial for normal computer calculations. It gives a valuable insight to the problem to be solved and will be useful for those engaged in proving or disproving Beal's Conjecture.

Some examples for Beal's Conjecture:

In all the examples given below, the values of x, y, and z are above 2, and A, B, C are considered from 1 to 16, and x, y, z are considered from 3 to 15. These are the only Eighty Five solutions for the particular set. All of A, B, and C have common prime factors 2, 3 or 7. Beal's conjecture is valid for this selected set of values for A, B, C, x, y, and z. only 10 equality values are listed below, the rest are in appendix A.

	A	B	C	x	y	z	A^x	+	B^y	=	C^z
1).	2	2	2	3	3	4	8	+	8	=	16
2).	2	2	2	4	4	5	16	+	16	=	32
3).	2	2	2	5	5	6	32	+	32	=	64
4).	2	2	2	6	6	7	64	+	64	=	128
5).	2	2	2	7	7	8	128	+	128	=	256
6).	2	2	2	8	8	9	256	+	256	=	512
7).	2	2	2	9	9	10	512	+	512	=	1024
8).	2	2	2	10	10	11	1024	+	1024	=	2048
9).	2	2	2	11	11	12	2048	+	2048	=	4096
10).	2	2	2	12	12	13	4096	+	4096	=	8192

Now, let us see the cases where x, y, and z are less than 3, though Beal's Conjecture is not relevant for these cases..

A, B, and C considered from 1 to 5. Values of x, y, and z, are considered for only 1, and 2. In the result, it is seen that A, B, C have only common factor 1 in all cases as the exponents are less than 3. Here also, 10 values are listed, rest in Appendix B.

	A	B	C	x	y	z	A^x	+	B^y	=	C^z
1).	1	1	2	1	1	1	1	+	1	=	2
2).	1	1	2	1	2	1	1	+	1	=	2
3).	1	1	2	2	1	1	1	+	1	=	2
4).	1	1	2	2	2	1	1	+	1	=	2
5).	1	2	3	1	1	1	1	+	2	=	3
6).	1	2	3	2	1	1	1	+	2	=	3
7).	1	2	5	1	2	1	1	+	4	=	5
8).	1	2	5	2	2	1	1	+	4	=	5
9).	1	3	2	1	1	2	1	+	3	=	4
10).	1	3	2	2	1	2	1	+	3	=	4

Redefinition of the problem

$A^x + B^y = C^z$ can also be written as $A^x + B^y - C^z = 0$. Both mean the same thing. $A^x + B^y - C^z = 0$ is a turning point for the values of A, B, C, x, y, and z. there can be values for A, B, and C for which $A^x + B^y - C^z$ is less than zero, and $A^x + B^y - C^z$ is greater than zero. The zero-value turning point $A^x + B^y - C^z = 0$ for a particular value of A, B, C, x, y, and z, lies between a negative value and a positive value. Actually, the value of $A^x + B^y - C^z$ turns over from negative to positive or from positive to negative in some cases.

What is to be proved is that for mutually prime values of A, B, and C, $A^x + B^y - C^z = 0$ does not exist for x, y, and z greater than 2 and different..

It is already demonstrated numerically in Appendix A, wherever the zero-value turning point occur, the values of A, B, and C have a prime factor 2, 3, and 7 in the range of values considered for A, B, C and x, y, z. It is seen from the examples that the minimum value of A is 2 when x, y, and z are greater than 2 for a zero-value turning point.

When x, y, and z are less than 3, there are a large number of zero-value turning points with common factor 1 for A, B, and C. Beal's conjecture needs only values of x, y, and z greater than 2 and all different.

When we consider A, B, and C as mutually prime, both A and B cannot be even. If $A^x + B^y - C^z = 0$, then 2 will be a common factor for A and B, and C also will have the same common factor. So, one of them is odd and the other even. C becomes odd, as odd + even cannot be even. Let A be odd and B even, interchanging A and B if

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necessary. So, two of A, B, and C are odd and one even.
If A, and B, are odd, then C will be even.

Any odd number can be written as **2i + 1,** any even number can be written as **2**j, and any different odd number can be written as **2k + 1** where i, j, and k can take values from 1 to infinity.

These general values can be used to get mutually prime values for A, B, and C. the possible even-odd combinations for mutually prime A, B, and C are
1). A, odd, B even and C, odd, interchanging A, and B if necessary.
2). A, odd, B odd, and C, even.

Beal's conjecture is to be solved for the above two combinations of mutually prime values of A, B, and C only showing that the equality $A^x + B^y - C^z = 0$ cannot exist for values of x, y, and z greater than 2 and different.

Values of A, B and C can be written as follows for all values of n from 1 to infinity.
A = (2n + 2i +1) odd for all values of i from 0 to infinity.

B = (2n + 2j +1) odd for all values of j from 0 to infinity.

C = (2n +2k) even for all values of k from 1 to infinity.

The values of i and j, if equal, will make A and B equal..

Values of A, B and C can be written as follows for all values of n from 1 to infinity.
A = (2n + 2i +1) Odd for all values of i from 0 to infinity.

B = (2n + 2j) Even for all values of j from 1 to infinity.

C = (2n + 2k + 1) Odd for all values of k from 0 to infinity.

As x, y, and z are greater than 2,
x = 2 + u
y = 2 + v, and
z = 2 + w

Values of A, B, and C, are considered from 3 to 15 in steps of 2. Values of x, y, z, are considered from 3 to 15 in a way that they are not equal as the equality case is already proved in Fermat's Last Theorem.

A demonstration of turning point nature of the problem is given below. The middle term shows the turning point values, the immediately preceding value is positive and the immediately succeeding value is negative. Here, the values of A and B are reduced by two for the first value and increased by two for the third value. For all turning value zero cases this occurs. In some cases the first value can be negative, the middle one zero, and the last one positive, depending on what values are changed. In the case considered, A, B, and C have a common factor 3. We are interested in cases where they do not have common factor.

	A	B	C	x	y	z	A^x	+	B^y	-	C^z	=	
15382)	1	6	1	3	3	5	1	+	216	-	1	=	216
15382)	**3**	**6**	**3**	**3**	**3**	**5**	**27**	**+**	**216**	**-**	**243**	**=**	**0**
15382)	5	6	5	3	3	5	125	+	216	-	3125	=	-2784

As all of A, B, and c are altered to get the previous and subsequent values, the turning point value changes from positive to negative.

Last values tried were for A = 17, B = 16, C = 17, x = 16, y = 16, and z = 16. Full results are not shown due to size.

Case1: Using the following equations for A, B, and C

A = (2n + 2i +1), B = (2n + 2j) and C = (2n + 2k + 1) the turning points are calculated for the mutually prime values of A, B, and C. The turning point is a positive non-zero value. For (A - 2) it is negative and for (A + 2) it is positive as seen in the results. The turning point lies between a negative and positive value or a positive and negative value for specific cases.

Number	**A**	**B**	**C**	**x**	**y**	**z**	**$(A - 2)^x + B^y - C^z$**	**$A^x + B^y - C^z$**	**$(A + 2)^x + B^y - C^z$**
1	3	4	5	4	3	3	-60	20	564
2	3	4	5	5	3	3	-60	182	3064
3	3	4	5	6	3	3	-60	668	15564
4	3	4	5	6	3	4	-560	168	15064
5	3	4	5	6	4	4	-368	360	15256
6	3	4	7	5	4	3	-86	156	3038
7	3	4	7	6	3	3	-278	450	15346
8	3	4	7	6	4	3	-86	642	15538
9	3	4	9	6	3	3	-664	64	14960

10	3	4	9	6	4	3	-472	256	15152
11	3	6	5	6	3	4	-408	320	15216
12	3	6	7	5	3	3	-126	116	2998
13	3	6	7	6	3	3	-126	602	15498
14	3	6	9	6	3	3	-512	216	15112
15	3	8	5	5	3	4	-112	130	3012
16	3	8	5	6	3	4	-112	616	15512
17	3	8	9	5	3	3	-216	26	2908
18	3	8	9	6	3	3	-216	512	15408
19	5	4	5	3	3	3	-34	64	282
20	5	4	5	4	3	4	-480	64	1840
21	5	4	5	4	4	4	-288	256	2032
22	5	4	5	5	3	4	-318	2564	16246
23	5	4	5	5	3	5	-2818	64	13746
24	5	4	5	5	4	4	-126	2756	16438
25	5	4	5	5	4	5	-2626	256	13938
26	5	4	5	5	5	5	-1858	1024	14706
27	5	4	5	6	3	5	-2332	12564	114588
28	5	4	5	6	3	6	-14832	64	102088
29	5	4	5	6	4	5	-2140	12756	114780
30	5	4	5	6	4	6	-14640	256	102280

Here in **case 2**, instead of A, from the value of B, 2 is subtracted for prior value and 2 is added to get the third value. The middle value gives the turning point which is a positive non-zero value.

Number	**A**	**B**	**C**	**x**	**y**	**z**	$A^x+(B-2)^y-C^z$	$A^x+B^y-C^z$	$A^x+(B+2)^y-C^z$
1	3	4	5	3	4	3	-82	158	1198
2	3	4	5	3	5	3	-66	926	7678
3	3	4	5	3	5	4	-566	426	7178
4	3	4	5	3	6	3	-34	3998	46558
5	3	4	5	3	6	4	-534	3498	46058
6	3	4	5	3	6	5	-3034	998	43558
7	3	4	5	4	3	3	-36	20	172
8	3	4	5	4	4	3	-28	212	1252
9	3	4	5	4	5	3	-12	980	7732
10	3	4	5	4	5	4	-512	480	7232
11	3	4	5	4	6	4	-480	3552	46112
12	3	4	5	4	6	5	-2980	1052	43612
13	3	4	5	5	5	4	-350	642	7394
14	3	4	5	5	6	4	-318	3714	46274
15	3	4	5	5	6	5	-2818	1214	43774
16	3	4	5	6	6	5	-2332	1700	44260
17	3	4	7	3	5	3	-284	708	7460
18	3	4	7	3	6	3	-252	3780	46340
19	3	4	7	3	6	4	-2310	1722	44282
20	3	4	7	4	5	3	-230	762	7514
21	3	4	7	4	6	3	-198	3834	46394
22	3	4	7	4	6	4	-2256	1776	44336
23	3	4	7	5	4	3	-84	156	1196
24	3	4	7	5	5	3	-68	924	7676
25	3	4	7	5	6	3	-36	3996	46556
26	3	4	7	5	6	4	-2094	1938	44498
27	3	4	7	6	6	4	-1608	2424	44984
28	3	4	9	3	5	3	-670	322	7074
29	3	4	9	3	6	3	-638	3394	45954
30	3	4	9	4	5	3	-616	376	7128
31	3	4	9	4	6	3	-584	3448	46008

32	3	4	9	5	5	3	-454	538	7290
33	3	4	9	5	6	3	-422	3610	46170
34	3	6	5	3	3	3	-34	118	414

In **case 3**, instead of B, from the value of C, 2 is subtracted for prior value and 2 is added to get the third value. The middle value gives the turning point which is a negative non-zero value. The value turns from positive to negative.

Number	**A**	**B**	**C**	**x**	**y**	**z**	$A^x + B^y - (C-2)^z$	$A^x + B^y - C^z$	$A^x + B^y - (C+2)^z$
1	3	4	5	3	3	3	64	-34	-252
2	3	4	5	3	3	4	10	-534	-2310
3	3	4	5	3	4	4	202	-342	-2118
4	3	4	5	3	4	5	40	-2842	-16524
5	3	4	5	3	5	5	808	-2074	-15756
6	3	4	5	3	5	6	322	-14574	-116598
7	3	4	5	3	6	6	3394	-11502	-113526
8	3	4	5	4	3	4	64	-480	-2256
9	3	4	5	4	4	4	256	-288	-2064
10	3	4	5	4	4	5	94	-2788	-16470
11	3	4	5	4	5	5	862	-2020	-15702
12	3	4	5	4	5	6	376	-14520	-116544
13	3	4	5	4	6	6	3448	-11448	-113472
14	3	4	5	5	3	4	226	-318	-2094
15	3	4	5	5	3	5	64	-2818	-16500
16	3	4	5	5	4	4	418	-126	-1902
17	3	4	5	5	4	5	256	-2626	-16308
18	3	4	5	5	5	5	1024	-1858	-15540
19	3	4	5	5	5	6	538	-14358	-116382
20	3	4	5	5	6	6	3610	-11286	-113310
21	3	4	5	6	3	5	550	-2332	-16014
22	3	4	5	6	3	6	64	-14832	-116856
23	3	4	5	6	4	5	742	-2140	-15822
24	3	4	5	6	4	6	256	-14640	-116664
25	3	4	5	6	5	5	1510	-1372	-15054
26	3	4	5	6	5	6	1024	-13872	-115896
27	3	4	5	6	6	6	4096	-10800	-112824
28	3	4	7	3	4	3	158	-60	-446
29	3	4	7	3	5	4	426	-1350	-5510
30	3	4	7	3	6	5	998	-12684	-54926
31	3	4	7	4	3	3	20	-198	-584
32	3	4	7	4	4	3	212	-6	-392
33	3	4	7	4	5	4	480	-1296	-5456

In case 4, all of A, B, and C are reduced by 2 to get the previous value and increased by 2 to get the value after the turning point.

Number	**A**	**B**	**C**	**x**	**y**	**z**	$(A-2)^x + (B-2)^y - (C-2)^z$	$A^x + B^y - C^z$	$(A+2)^x + (B+2)^y - (C+2)^z$
1	3	4	5	3	4	3	-10	158	1078
2	3	4	5	3	5	4	-48	426	5500
3	3	4	5	3	6	4	-16	3498	44380
4	3	4	5	3	6	5	-178	998	29974
5	3	4	5	4	3	3	-18	20	498
6	3	4	5	4	4	3	-10	212	1578
7	3	4	5	4	5	4	-48	480	6000
8	3	4	5	4	6	4	-16	3552	44880
9	3	4	5	4	6	5	-178	1052	30474
10	3	4	5	5	3	3	-18	182	2998

11	3	4	5	5	4	3	-10	374	4078
12	3	4	5	5	5	4	-48	642	8500
13	3	4	5	5	6	4	-16	3714	47380
14	3	4	5	5	6	5	-178	1214	32974
15	3	4	5	6	3	3	-18	668	15498
16	3	4	5	6	3	4	-72	168	13440
17	3	4	5	6	4	3	-10	860	16578
18	3	4	5	6	4	4	-64	360	14520
19	3	4	5	6	5	4	-48	1128	21000
20	3	4	5	6	6	4	-16	4200	59880
21	3	4	5	6	6	5	-178	1700	45474
22	3	4	7	3	5	3	-92	708	7172
23	3	4	7	3	6	3	-60	3780	46052
24	3	4	7	3	6	4	-560	1722	40220
25	3	4	7	4	5	3	-92	762	7672
26	3	4	7	4	6	3	-60	3834	46552
27	3	4	7	4	6	4	-560	1776	40720
28	3	4	7	5	4	3	-108	156	3692
29	3	4	7	5	5	3	-92	924	10172
30	3	4	7	5	6	3	-60	3996	49052
31	3	4	7	5	6	4	-560	1938	43220
32	3	4	7	6	3	3	-116	450	15112
33	3	4	7	6	4	3	-108	642	16192
34	3	4	7	6	5	3	-92	1410	22672

Case 5

Interchanging the equations B, and C, we can have A and B odd, and C even. A = (2n + 2i +1), B = (2n + 2j + 1) and C = (2n + 2k) the turning points are calculated for the mutually prime values of A, B, and C. Here, A is decreased by 2 for previous value and increased by 2 for the value after the turning point value which is never zero. B and C are not altered.

Number	**A**	**B**	**C**	**x**	**y**	**z**	**$(A-2)^x+B^y-C^z$**	**$A^x+B^y-C^z$**	**$(A+2)^x+B^y-C^z$**
1	**3**	**5**	**4**	**5**	**3**	**4**	**-130**	**112**	**2994**
2	**3**	**5**	**4**	**6**	**3**	**4**	**-130**	**598**	**15494**
3	**3**	**5**	**4**	**6**	**4**	**5**	**-398**	**330**	**15226**
4	**3**	**5**	**6**	**5**	**3**	**3**	**-90**	**152**	**3034**
5	**3**	**5**	**6**	**6**	**3**	**3**	**-90**	**638**	**15534**
6	**3**	**5**	**6**	**6**	**4**	**4**	**-670**	**58**	**14954**
7	**3**	**5**	**8**	**6**	**3**	**3**	**-386**	**342**	**15238**
8	**3**	**7**	**4**	**6**	**3**	**5**	**-680**	**48**	**14944**
9	**3**	**7**	**8**	**5**	**3**	**3**	**-168**	**74**	**2956**
10	**3**	**7**	**8**	**6**	**3**	**3**	**-168**	**560**	**15456**
11	**3**	**9**	**4**	**6**	**3**	**5**	**-294**	**434**	**15330**
12	**3**	**9**	**6**	**6**	**3**	**4**	**-566**	**162**	**15058**
13	**5**	**5**	**4**	**4**	**3**	**4**	**-50**	**494**	**2270**
14	**5**	**5**	**4**	**4**	**4**	**5**	**-318**	**226**	**2002**
15	**5**	**5**	**4**	**5**	**3**	**5**	**-656**	**2226**	**15908**
16	**5**	**5**	**4**	**5**	**4**	**5**	**-156**	**2726**	**16408**
17	**5**	**5**	**4**	**5**	**5**	**6**	**-728**	**2154**	**15836**
18	**5**	**5**	**4**	**6**	**3**	**5**	**-170**	**14726**	**116750**
19	**5**	**5**	**4**	**6**	**3**	**6**	**-3242**	**11654**	**113678**
20	**5**	**5**	**4**	**6**	**4**	**6**	**-2742**	**12154**	**114178**
21	**5**	**5**	**4**	**6**	**5**	**6**	**-242**	**14654**	**116678**
22	**5**	**5**	**6**	**3**	**3**	**3**	**-64**	**34**	**252**
23	**5**	**5**	**6**	**4**	**3**	**3**	**-10**	**534**	**2310**

24	5 5 6 5 3 4	-928	1954	15636
25	5 5 6 5 4 4	-428	2454	16136
26	5 5 6 6 3 4	-442	14454	116478
27	5 5 6 6 3 5	-6922	7974	109998
28	5 5 6 6 4 5	-6422	8474	110498
29	5 5 6 6 5 5	-3922	10974	112998
30	5 5 8 4 3 3	-306	238	2014
31	5 5 8 5 3 3	-144	2738	16420
32	5 5 8 5 5 4	-728	2154	15836

Case 6

We have A and B odd, and C even. A = (2n + 2i +1), B = (2n + 2j + 1) and C = (2n + 2k) the turning points are calculated for the mutually prime values of A, B, and C. Here, B is decreased by 2 for previous value and increased by 2 for the value after the turning point value which is never zero. Values of A and C are kept fixed.

Number	A B C x y z	$A^x+(B-2)^y-C^z$	$A^x+B^y-C^z$	$A^x+(B+2)^y-C^z$
1	3 5 4 3 3 3	-10	88	306
2	3 5 4 3 4 4	-148	396	2172
3	3 5 4 3 5 5	-754	2128	15810
4	3 5 4 3 6 5	-268	14628	116652
5	3 5 4 3 6 6	-3340	11556	113580
6	3 5 4 4 4 4	-94	450	2226
7	3 5 4 4 5 5	-700	2182	15864
8	3 5 4 4 6 5	-214	14682	116706
9	3 5 4 4 6 6	-3286	11610	113634
10	3 5 4 5 5 5	-538	2344	16026
11	3 5 4 5 6 5	-52	14844	116868
12	3 5 4 5 6 6	-3124	11772	113796
13	3 5 4 6 4 5	-214	330	2106
14	3 5 4 6 5 5	-52	2830	16512
15	3 5 4 6 6 6	-2638	12258	114282
16	3 5 6 3 4 3	-108	436	2212
17	3 5 6 3 5 4	-1026	1856	15538
18	3 5 6 3 6 4	-540	14356	116380
19	3 5 6 3 6 5	-7020	7876	109900
20	3 5 6 4 4 3	-54	490	2266
21	3 5 6 4 5 4	-972	1910	15592
22	3 5 6 4 6 4	-486	14410	116434
23	3 5 6 4 6 5	-6966	7930	109954
24	3 5 6 5 5 4	-810	2072	15754
25	3 5 6 5 6 4	-324	14572	116596
26	3 5 6 5 6 5	-6804	8092	110116
27	3 5 6 6 4 4	-486	58	1834
28	3 5 6 6 5 4	-324	2558	16240
29	3 5 6 6 6 5	-6318	8578	110602
30	3 5 8 3 4 3	-404	140	1916
31	3 5 8 3 5 3	-242	2640	16322
32	3 5 8 3 6 4	-3340	11556	113580

Case 7

We have A and B odd, and C even. A = (2n + 2i +1), B = (2n + 2j + 1) and C = (2n + 2k) the turning points are calculated for the mutually prime values of A, B, and C. Here, C is decreased by 2 for previous value and increased by 2 for the value after the turning point value which is never zero turns over from positive to negative. Values of A and B are kept fixed.

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Number	A B C x y z	$A^x+B^y-(C-2)^z$	$A^x+B^y-C^z$	$A^x+B^y-(C+2)^z$
1	3 5 4 3 3 4	136	-104	-1144
2	3 5 4 3 3 5	120	-872	-7624
3	3 5 4 3 3 6	88	-3944	-46504
4	3 5 4 3 4 5	620	-372	-7124
5	3 5 4 3 4 6	588	-3444	-46004
6	3 5 4 3 5 6	3088	-944	-43504
7	3 5 4 4 3 4	190	-50	-1090
8	3 5 4 4 3 5	174	-818	-7570
9	3 5 4 4 3 6	142	-3890	-46450
10	3 5 4 4 4 5	674	-318	-7070
11	3 5 4 4 4 6	642	-3390	-45950
12	3 5 4 4 5 6	3142	-890	-43450
13	3 5 4 5 3 5	336	-656	-7408
14	3 5 4 5 3 6	304	-3728	-46288
15	3 5 4 5 4 5	836	-156	-6908
16	3 5 4 5 4 6	804	-3228	-45788
17	3 5 4 5 5 6	3304	-728	-43288
18	3 5 4 6 3 5	822	-170	-6922
19	3 5 4 6 3 6	790	-3242	-45802
20	3 5 4 6 4 6	1290	-2742	-45302
21	3 5 4 6 5 6	3790	-242	-42802
22	3 5 6 3 3 3	88	-64	-360
23	3 5 6 3 4 4	396	-644	-3444
24	3 5 6 3 5 5	2128	-4624	-29616
25	3 5 6 3 6 6	11556	-31004	-246492
26	3 5 6 4 3 3	142	-10	-306
27	3 5 6 4 4 4	450	-590	-3390
28	3 5 6 4 5 5	2182	-4570	-29562
29	3 5 6 4 6 6	11610	-30950	-246438
30	3 5 6 5 3 4	112	-928	-3728
31	3 5 6 5 4 4	612	-428	-3228
32	3 5 6 5 5 5	2344	-4408	-29400

Case 8

We have A and B odd, and C even. A = (2n + 2i +1), B = (2n + 2j + 1) and C = (2n + 2k) the turning points are calculated for the mutually prime values of A, B, and C. Here, A, B, and C are decreased by 2 for previous value and increased by 2 for the value after the turning point value which is never zero turns over from negative to positive.

Number	A B C x y z	$(A-2)^x+(B-2)^y-(C-2)^z$	$A^x+B^y-C^z$	$(A+2)^x+(B+2)^y-(C+2)^z$
1	3 5 6 3 5 4	-12	1856	12836
2	3 5 6 3 6 5	-294	7876	85006
3	3 5 6 4 5 4	-12	1910	13336
4	3 5 6 4 6 5	-294	7930	85506
5	3 5 6 5 3 3	-36	152	2956
6	3 5 6 5 5 4	-12	2072	15836
7	3 5 6 5 6 5	-294	8092	88006
8	3 5 6 6 3 3	-36	638	15456
9	3 5 6 6 4 4	-174	58	13930
10	3 5 6 6 5 4	-12	2558	28336
11	3 5 6 6 6 5	-294	8578	100506
12	3 5 8 3 4 3	-134	140	1526
13	3 5 8 3 6 4	-566	11556	107774
14	3 5 8 4 4 3	-134	194	2026
15	3 5 8 4 6 4	-566	11610	108274

16	**3 5 8 5 4 3**	**-134**	**356**	**4526**
17	**3 5 8 5 6 4**	**-566**	**11772**	**110774**
18	**3 5 8 6 3 3**	**-188**	**342**	**14968**
19	**3 5 8 6 4 3**	**-134**	**842**	**17026**
20	**3 5 8 6 6 4**	**-566**	**12258**	**123274**
21	**3 7 8 5 3 3**	**-90**	**74**	**2854**
22	**3 7 8 6 3 3**	**-90**	**560**	**15354**
23	**5 5 6 3 3 3**	**-10**	**34**	**174**
24	**5 5 6 3 6 5**	**-268**	**7974**	**85224**
25	**5 5 6 4 6 5**	**-214**	**8474**	**87282**
26	**5 5 6 5 6 5**	**-52**	**10974**	**101688**
27	**5 5 6 6 3 5**	**-268**	**7974**	**85224**
28	**5 5 6 6 4 5**	**-214**	**8474**	**87282**
29	**5 5 6 6 5 5**	**-52**	**10974**	**101688**
30	**5 5 8 3 4 3**	**-108**	**238**	**1744**
31	**5 5 8 3 6 4**	**-540**	**11654**	**107992**
32	**5 5 8 4 3 3**	**-108**	**238**	**1744**

For the cases 1 to 4, A and C are odd and B is even. For all cases from 5 to 8 A, and B are odd and C is even. In all cases, A, B, and C are mutually prime as the equations used for A, B, and C give mutually prime values.

A = (2n + 2i +1), B = (2n + 2j) and C = (2n + 2k + 1) are used for cases 1 to 4 and equations A = (2n + 2i +1), B = (2n + 2j + 1) and C = (2n + 2k) for cases 5 to 8. For testing, the values of n, i, j, and k are all varied from 1 to 3 to control the volume of output. The values for x, y, and z are 3 to 6.

No equality turning point could be found to contradict Beal's Conjecture for these tried cases.

What remains is to prove logically for values of x, y, and z greater than 2, $A^x + B^y - C^z = 0$ is impossible for the values of A, B, and C got from the above equations which give mutually prime values for A, B, and C.

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