Direct Proof of Beal's Conjecture

by Roberto Iannone

In 1993, the banker Andrew Beal, fond of number theory, analyzing the Fermat's Last Theorem and generalizing it, formulated the conjecture that the exponents of the powers of the equation, the bases of which are coprime, can be of different degree, provided that the degree of one of the powers is equal to 2. The proof of Beal's conjecture which I propose descends consequently by direct demonstration of the Fermat's Last theorem formulated by me, with the use of the mathematical properties of algebraic equations and inequalities.

Theorem

It is possible to divide a power of degree p in the sum of two powers respectively of degree n and m, which has three bases are coprime, only if the degree of the power or one of the two powers is equal to 2.

Demonstration

1) - $A^m + B^n = C^p$ **A,B,C** e **m,n,p** are respectively with integers the bases coprime and the exponents of the powers of the equation > **2**.; we have also

2) - $\dfrac{A^m + B^n}{C^p} = 1$ **The power C^p is also equal to the binomial $(S + T)^p$,** that is Newton's, binomial **with S and T integers for which we have also**

3) - $A^m + B^n = (S+T)^p$ we isolate and developing the 2^{nd} member we have

4) - $S^p+T^p+ R = C^p$ S^p and T^p are the extreme terms of the polinomial, while with **R** are indicated the other terms of the polynomial and again we have

5) - $\frac{S^p + T^p}{C^p} > 0 > \frac{1}{2}$ and also .

6) - $\frac{R}{C^P} > 0 < \frac{1}{2}$ major and minor referred to 1/2 of the **5)** and **6)** are interchangeablewe. Extract root **p** at **5)** and **6)** and we have

7) - $\frac{(S^p + T^p)^{1/p}}{C} > 0 > \left(\frac{1}{2}\right)^{1/p}$ and also

8) - $\frac{R^{1/p}}{C} > 0 < \left(\frac{1}{2}\right)^{1/p}$ and so adding the **7)** and the**8)** we have

9) - $\frac{(S^p + T^p)^{1/p}}{C} + \frac{R^{1/p}}{C} > 1 < 2\left(\frac{1}{2}\right)^{1/p}$ extracting the nth roots to the second terms of the inequality, we get that each of the two terms: and $(½)^{1/p}$ **tend to 1** and by adding they **tend to 2**.

In order for the inequality **9)** to be verified, it is necessary that the second member equals term $2^{1/p}$ with the same common value of the exponent **p**, therefore we can write

10) - $\frac{(S^p + T^p)^{1/p}}{C} + \frac{R^{1/p}}{C} > 1 < 2^{1/p}$ **for the Fermat's Last Theorem,** by me proved, so that the two inequalities coincide the exponent **p must be equal to 2.** Therefore by substituing the exponent **2** for **4)** we will have

11) - $S^2+T^2+ R = C^2$ and then substituing C^2 **to** the **1)** we obtain

12) - $A^m + B^n = C^2$

With similar procedure it is shown that the degree of one of the two powers is equal to 2

13) – $A^m + B^n = C^p$ **A, B, C** and **m, n, p** are respectively bases coprime and exponents with integers of the powers of the equation. We obtain from the equation also

14) - $C^p - B^n = A^m$ The power A^m is also equal to the binomial $(V + Z)^m$, **that is Newton's binomial, with V and Z integers, therefore we write**

15) - $C^p - B^n = (V+Z)^m$ isolate and developing the **2nd** member of the equation we get

16) - $V^m+Z^m+R = A^m$ V^m and Z^m are the extreme terms of the polinomial, while **with R** are **indicated the other terms of the polynomial** and again **we** have

17) - $\frac{V^m+Z^m}{A^m} > 0 > \frac{1}{2}$ and also

18) - $\frac{R}{A^m} > 0 < \frac{1}{2}$ major and minor referred to **1/2** of the **17)** and **18)** are interchangeablewe. Extract root **m** at **17)** and **18)** we have

19) - $\frac{(V^m+Z^m)^{1/m}}{A} > 0 > \left(\frac{1}{2}\right)^{1/m}$ and also

20) - $\frac{R^{1/m}}{A} > 0 < \left(\frac{1}{2}\right)^{1/m}$ and so adding the **19)** and the **20)** we have

21) - $\frac{(V^m+Z^m)^{1/m}}{A} + \frac{R^{1/m}}{A} > 1 < 2\left(\frac{1}{2}\right)^{1/m}$ extracting the nth roots to . the second terms of the inequality, we get that each of the two terms: and b $(\frac{1}{2})^{1/m}$ **tend to 1** and by adding they **tend to 2 .**

In order for the inequality **21)** to be verified, it is necessary that the second member equals term $2^{1/m}$ with the same common value of the exponent **m**, therefore we can write

22) - $\frac{(V^m+Z^m)^{1/m}}{A} + \frac{R^{1/m}}{A} > 1 < 2^{1/m}$ **for the Fermat's Last Theorem,** by me proved, so that the two inequalities coincide the exponent **m must be equal to 2.** Therefore by substituing the exponent **2** for **16)** we will have

23) - $V^2+Z^2+R = A^2$ and then being A^2 to the**14)** we get the **13)**

24) - $A^2 + B^n = C^p$ **Similarly it is demonstrates for the power** B^n

Q. E. D.

References

[1] Roberto Iannone, Direct Proof of Fermat's Last Theorem

submitted

[2] Wikipedia: Fermat's Last Theorem

[3] R. D. Mauldin, A Generalization of Fermat's Last Theorem:[3] R. D. Mauldin, A Generalization of Fermat's Last Theorem:The Beal Conjecture and Prize http://www.ams.org/notices/199711/Beal.pdf

[4] Wikipedia:Beal's Conjecture.