Proof of Beal's Conjecture (Condensed Version) By: Don Blazys.

Abstract:

In all cases both logical and mathematical, it *must* be possible to substitute identities. In this paper, we present a newly discovered logarithmic identity whose properties demonstrate that division by zero *prevents* the substitution of identities if and only if it is assumed that "Beal's Conjecture" is false.

Description:

Beal's Conjecture can be stated as follows: For positive integers: $a, b, c, x, y, z,$
if: $a^x + b^y = c^z$ and: a, b, c are co-prime, then: x, y, z are not *all* greater than 2 .

Proof:

Let: $a, b, c = \{1,2,3,4 \ldots\},\ x, y = \{3,4,5,6 \ldots\},\ Z = \{1,3,5,7 \ldots\},\ z = \{2,4,6,8 \ldots\},\ T = \{2,3,4,5 \ldots\},$
$a^x < b^y < \{c^Z,\ c^z\}$, and let: a, b, c be co-prime, so that the only common factor possible is: $1 = \frac{T}{T}$.
Now, if we assume that "Beal's Conjecture" is false, then: $Z > 2$, $z > 2$,

$$a^x + b^y = \sqrt{((b^y - a^x)^2 + 4a^x b^y)} = \sqrt{(c^Z)^2} = c^Z = \left(\frac{T}{T}\right) c^Z = T\left(\frac{c}{T}\right)^{\frac{\frac{(Z)\ln(c)}{\ln(T)} - 1}{\frac{\ln(c)}{\ln(T)} - 1}} , \tag{1}$$

$$a^x + b^y = \sqrt{((b^y - a^x)^2 + 4a^x b^y)} = \sqrt{(c^z)^2} = \left(c^{\frac{z}{2}}\right)^2 = \left(\left(\frac{T}{T}\right) c^{\frac{z}{2}}\right)^2 = \left(T\left(\frac{c}{T}\right)^{\frac{\frac{\left(\frac{z}{2}\right)\ln(c)}{\ln(T)} - 1}{\frac{\ln(c)}{\ln(T)} - 1}}\right)^2 , \tag{2}$$

and division by zero *prevents* the substitution of: $\frac{c}{c}$ for: $\frac{T}{T}$ in equations (1) and (2).
Thus, the assumption that "Beal's Conjecture" is false results in a classic *contradiction*,
because clearly, we *can't* divide by zero, yet it *must* be possible to substitute: $\mathbf{1} = \frac{\boldsymbol{c}}{\boldsymbol{c}}$ **for:** $\mathbf{1} = \frac{\boldsymbol{T}}{\boldsymbol{T}}$.
However, if we assume that "Beal's Conjecture" is true, then: $Z = 1$, $z = 2$,

$$a^x + b^y = \sqrt{((b^y - a^x)^2 + 4a^x b^y)} = \sqrt{(c^1)^2} = c^1 = \left(\frac{T}{T}\right) c^1 = T\left(\frac{c}{T}\right)^1 , \tag{3}$$

$$a^x + b^y = \sqrt{((b^y - a^x)^2 + 4a^x b^y)} = \sqrt{(c^2)^2} = (c^1)^2 = \left(\left(\frac{T}{T}\right) c^1\right)^2 = \left(T\left(\frac{c}{T}\right)^1\right)^2 , \tag{4}$$

and substituting: $\frac{c}{c}$ for: $\frac{T}{T}$ in equations (3) and (4) is *not* prevented, and results in:

$$a^x + b^y = \sqrt{((b^y - a^x)^2 + 4a^x b^y)} = \sqrt{(c^1)^2} = c^1 = \left(\frac{c}{c}\right) c^1 = c\left(\frac{c}{c}\right)^1 \tag{5}$$

and: $$a^x + b^y = \sqrt{((b^y - a^x)^2 + 4a^x b^y)} = \sqrt{(c^2)^2} = \left(c^1\right)^2 = \left(\left(\frac{c}{c}\right) c^1\right)^2 = \left(c\left(\frac{c}{c}\right)^1\right)^2 . \tag{6}$$

Thus, we have demonstrated that division by zero prevents the substitution of: 1 for: 1 ***if and only if*** we assume that "Beal's Conjecture" is false. Therefore, that assumption must be wrong, and the conjecture has been proved. ■

Notes:

The logarithmic identities in equations (1) and (2) can be similarly derived as follows:

$$\left(\frac{T}{T}\right)c^Z = T\left(\frac{c}{T}\right)^{\frac{\ln\left(\frac{c^Z}{T}\right)}{\ln\left(\frac{c}{T}\right)}} = T\left(\frac{c}{T}\right)^{\frac{\frac{\ln\left(\frac{c^Z}{T}\right)}{\ln(T)}}{\frac{\ln\left(\frac{c}{T}\right)}{\ln(T)}}} = T\left(\frac{c}{T}\right)^{\frac{\frac{\ln(c^Z)}{\ln(T)}-\frac{\ln(T)}{\ln(T)}}{\frac{\ln(c)}{\ln(T)}-\frac{\ln(T)}{\ln(T)}}} = T\left(\frac{c}{T}\right)^{\frac{\frac{(Z)\ln(c)}{\ln(T)}-1}{\frac{\ln(c)}{\ln(T)}-1}} .$$

The “Beal equation” can also be represented as the difference:

$$c^z - b^y = \sqrt{((b^y + c^z)^2 - 4b^y c^z)} = \sqrt{(a^X)^2} = a^X = \left(\frac{T}{T}\right)a^X = T\left(\frac{a}{T}\right)^{\frac{\frac{(X)\ln(a)}{\ln(T)}-1}{\frac{\ln(a)}{\ln(T)}-1}} ,$$

for: $X = \{1,3,5,7\ \ldots\}$, and:

$$c^z - b^y = \sqrt{((b^y + c^z)^2 - 4b^y c^z)} = \sqrt{(a^x)^2} = \left(a^{\frac{x}{2}}\right)^2 = \left(\left(\frac{T}{T}\right)a^{\frac{x}{2}}\right)^2 = \left(T\left(\frac{a}{T}\right)^{\frac{\frac{\left(\frac{x}{2}\right)\ln(a)}{\ln(T)}-1}{\frac{\ln(a)}{\ln(T)}-1}}\right)^2 ,$$

for: $x = \{2,4,6,8\ \ldots\}$, which demonstrates that *any* sum or difference of two terms is implicitly a square under a second degree radical.

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