Proof of Beal's conjecture

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Introduction

The Beal conjecture is one of several unproven conjectures within number theory.
According to her, for integer values of A, B, and C and integer values of x, y, and z greater than or equal to three, the following equation must be fulfilled.

$$A^x + B^y = C^z (1)$$

y,x and z cannot be equal in which case the above equation would correspond to the equation of the last formatting theorem. Furthermore, there must be a prime common factor for both ab and c.

Fundamental principles

To begin with, trying to prove that this conjecture is true would involve showing that there is no counterexample whereby values of A, B, and C that are prime to each other satisfy Beal's equation.
Empirical attempts have already been made to find such values and they only exist when at least one of the three exponents is equal to two.
Pretending to find a valid counterexample would imply carrying out a number of calculations that are very likely to be unsuccessful.
It is more practical to try to discern what conditions must be fulfilled for Beal's conjecture to be valid.
Since one cannot prove a very infinite number of combinations of a and c, one must develop a method that depends preferably on valid relations between x, y, or z.
To prove these relationships, we must start from two theorems that will be used as basic tools.
The first is the so-called fermat's little theorem which states that the following quotient will always be an integer when p is a prime number.

$$k = \frac{\left(a^{p-1} - 1\right)}{p} (2)$$

The second tool states that an integer quotient will be obtained by applying the following formula when p is a prime number. This is known as Proth's theorem.

$$k = \frac{\left(a^{\frac{(p-1)}{2}} + 1\right)}{p} (3)$$

Finally, a generalized version of Fermat's little theorem would lead us to obtain an integer quotient by applying the following formula for certain cases where p is a prime number.

$$k = \frac{\left(a^{\frac{(p-1)}{q}} - 1\right)}{p} (4)$$

Formulas 2, 3, and 4 are used for certain cases of Beal's equation. In order to demonstrate that the conjecture is valid, starting from particular cases and reaching specific cases.