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Sahem's Problem

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Abstract

In this short paper, we present an open problem, which is an equation of three positive integers. Publishing this problem aims to find a solution or show that it hasn't.

Keywords: Fermat Theorem, Beal conjecture, and Open problem.

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1 Introduction

In number theory, many scientists state different theorems and conjectures, such as Fermat's Last Theorem [2], which stated that no three positive integers a, b and c satisfy the equation

$$a^n + b^n = c^n \text{ for any integer } n > 2.$$

This conjecture has been given as a generalization of the Pythagorean equation, in which $a^2 + b^2 = c^2$has infinitely many solutions.

But Mathematics professor Andrew Wiles has proved Fermat's Last Theorem in 1994 and published in 1995 [2], it was described as a "stunning advance" in the citation for Wiles's Abel Prize award in 2016.

Another problem in number theory is the Beal conjecture, which states that:

If $A^x + B^y = C^z$ where A, B, C, x, y and z are positive integers with x, y and $z > 2$, then A, B and C have a common prime factor.

Equivalently, there are no solutions to $A^x + B^y = C^z$ for positive integers A, B, C, x, y, z with $A, B,$ and C being pairwise coprime and all of x, y, z being greater than 2.

The conjecture was formulated in 1993 by Andrew Beal [3], and still open.

2 Open Problem:

As an extension of Fermat and Beal conjectures, we state the next new conjecture.

Conjecture 2.1: There are no three positive integers x, y, and z satisfy the following equation:

$$x^x + y^y = z^z.$$

Actually, we are working on this conjecture using computer calculations. Unfortunately, we haven't proved it yet.

Reference

1. G.H Hardy and E.M. Wright, "An introduction to theory of numbers", Oxford University, Press, London, 1975.
2. Andrew Bremner, " Review of Fermat's Enigma " (1998).
3. "The Abel Prize 2016". Norwegian Academy of Scienceand Letters. 2016. Retrieved 29 June 2017.