Abstract

It can be easily seen that every positive integer is written as sum of squares. In 1640, Fermat stated a theorem known as "Theorem of Fermat" which states that every prime of the form can be written as sum of two squares. On December 25, 1640, Fermat sent proof of this theorem in a letter to Mersenne. However, the proof of this theorem was first published by Euler in 1754, who also proved that the representation is unique. Later it was proved that a positive integer n is written as the sum of two squares if and only if each of its prime factors of the form occurs to an even power in the prime factorization of n. Diophantus stated a conjecture that no number of the form for non-negative integer \( k \), is written as sum of three squares which was verified by Descartes in 1638. Later Fermat stated that a positive integer can be written as a sum of three squares if and only if it is not of the form \( n = m^2 + k^2 \) where \( m \) and \( k \) are non-negative integers. This was proved by
Legendre in 1798 and then by Gauss in 1801 in more clear way. In 1621, Bachet stated a conjecture that "every positive integer can be written as sum of four squares, counting" and he verified this for all integers up to 325. Fifteen years later, Fermat claimed that he had a proof but no detail was given by him. A complete proof of this four square conjecture was published by Lagrange in 1772. Euler gave much simpler demonstration of Lagrange's four squares theorem by stating fundamental identity which allows us to write the product of two sums of four squares as sum of four squares and some other crucial results in 1773.

References


Index Terms

Computer Science  Information Sciences

Keywords

Integers  Prime  Squares  Sum  Euler