

1078-11-346

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and pentagonal sums.* Preliminary report.

Fermat claimed that all positive integers are represented by 3 triangular numbers, 4 squares, 5 pentagonal, . . . , and m m -gonal numbers. Its determination in the cases $m = 4$ (resp. $m = 3$) was celebrated work of Lagrange (resp. Gauss) and the full conjecture was finally resolved by Cauchy in 1813. In this talk, we will discuss the related question of which “weighted sums” represent all but finitely many positive integers, with a focus on complications which first arise in the $m = 5$ case. This is based on ongoing joint work with W.K. Chan and A. Haensch. (Received December 13, 2011)