Three Thirteens

By L. J. Lander

Abstract. From a computed solution to the Tarry-Escott problem two sets of thirteen integers are obtained having equal sums of odd powers through the thirteenth.

A recent computer search yielded a solution to the Tarry-Escott problem \( \sum_{i=1}^{n} a_i^j = \sum_{i=1}^{n} b_i^j \), \( j = 1, 2, \cdots, k \), with \( k = 14, n = 26 \). The terms \( a_1, a_2, \cdots, a_{26} \) are 1, 8, 9, 22, 23, 34, 36, 48, 50, 62, 75, 83, 89, 95, 97, 109, 130, 132, 134, 136, 156, 157, 158, 171, 173, and \( b_i = 175 - a_i \), \( i = 1, 2, \cdots, 26 \). Previously the solution with fewest terms for \( k = 14 \) had \( n = 30 \) [1]. From the new solution it is possible to derive \( \sum_{i=1}^{13} (b_i - a_i)^x = \sum_{i=1}^{26} |a_i - b_i|^x \) or \( 1^x + 9^x + 25^x + 51^x + 75^x + 79^x + 103^x + 107^x + 129^x + 131^x + 157^x + 159^x + 173^x = 3^x + 15^x + 19^x + 43^x + 85^x + 89^x + 93^x + 97^x + 137^x + 139^x + 141^x + 167^x + 171^x \) for \( x = 1, 3, 5, 7, 9, 11, 13 \) in which there are 13 terms on each side of the equation.

Control Data Corporation
4550 West 77th Street
Minneapolis, Minnesota 55435