

On the DPC partitions of a number

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The talk generalizes the problem of the partitions of a number into arithmetic progressions presented at the 43rd Australasian Combinatorics Conference. In this lecture, we will study the issue of dividing $n \in \mathbb{N}$ into parts whose differences between consecutive parts are consecutive integers. We denote the set of these partitions by $\text{DPC}(n)$. For instance: $(1, 5, 10, 16) \in \text{DPC}(32)$. We also present an explicit method to calculate all the partitions of $\text{DPC}(n)$ and we establish a formula for the cardinality of this set. Finally, we apply the results obtained to the problem of the representation of a positive integer a as a sum of consecutive triangular numbers. In particular, we focus on the case that a is a triangular number too.