

Combinatorial Proofs for Partition Identities and Divisibility Properties for Partitions of n with at Most m Parts

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Abstract

We show for a prime power number of parts m that the first differences of partitions into at most m parts can be expressed as a non-negative linear combination of partitions into at most $m - 1$ parts. To show this relationship, we combine a quasipolynomial construction of $p(n, m)$ with a new partition identity for a finite number of parts. Furthermore, we use this combinatorial interpretation to provide “universal” bijective proofs for divisibility properties of $p(n, m)$.