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SOME COMBINATORIAL ASPECTS OF CYCLOTOMIC POLYNOMIALS

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Euler showed that the number of partitions of n into distinct parts is equal to the number of partitions of n into odd parts. MacMahon showed that the number of partitions of n for which no part occurs exactly once is equal to the number of partitions of n into parts divisible by 2 or 3. Both these results are instances of a general phenomenon based on the fact that certain polynomials are the product of cyclotomic polynomials. After discussing this assertion, we explain how it can be extended to such topics as counting certain polynomials over finite fields and obtaining Dirichlet series generating functions for certain classes of integers.