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ON RAMANUJAN'S TAU-FUNCTION

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Abstract: We exhibit a recurrence relation for the Ramanujan's tau-function involving the sum of divisors function, whose solution gives a closed formula for $\tau(n)$ in terms of complete Bell polynomials. Besides, we show that it is possible to write $\tau(n)$ in terms of the compositions of n .

Keywords and Phrases: Z -transform, Sum of divisors function, Recurrence relations, Ramanujan's function $\tau(n)$, Complete Bell polynomials, Color partitions, Compositions.

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1. Introduction

We begin with the recurrence relation [1, 5, 6, 10, 20, 25, 30, 37]:

$$np_k(n) = -k \sum_{j=1}^n \sigma(j) p_k(n-j), \quad n \geq 1, \quad (1)$$