

Congruences for Bipartitions with Odd Parts Distinct

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Abstract: Hirschhorn and Sellers studied arithmetic properties of the number of partitions with odd parts distinct. In another direction, Hammond and Lewis investigated arithmetic properties of the number of bipartitions. In this paper, we consider the number of bipartitions with odd parts distinct. Let this number be denoted by $\text{pod}_{-2}(n)$. We obtain two Ramanujan type identities for $\text{pod}_{-2}(n)$, which imply that $\text{pod}_{-2}(2n+1)$ is even and $\text{pod}_{-2}(3n+2)$ is divisible by 3. Furthermore, we show that for any $\alpha \geq 1$ and $n \geq 0$, $\text{pod}_{-2}\left(3^{2\alpha+1}n + \frac{23 \times 3^{2\alpha} - 7}{8}\right)$ is a multiple of 3 and $\text{pod}_{-2}\left(5^{\alpha+1}n + \frac{11 \times 5^{\alpha} + 1}{4}\right)$ is divisible by 5. We also find combinatorial interpretations for the two congruences modulo 2 and 3.

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