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Aklilu Zeleke* (zeleke@msu.edu), Lyman Briggs College, E-194A Holmes Hall, East Lansing, MI 48825. *On the Representation of Certain Type of Real Numbers Using Combinatorial Identities.*

In this talk we give examples of combinatorial identities that can be used to represent real numbers of the form $a + br^n$, where $r < 1$. One such identity is

$$\begin{aligned} \frac{1}{12} \left(1 - \frac{1}{4^n} \right) &= \frac{1}{4^{2(n+1)}} \sum_{k=0}^n 9^k \binom{2n+1}{2k} - \frac{1}{4^{2(n+1)}} \sum_{k=0}^n 9^k \binom{2n+1}{2k+1} \\ &= \sum_{i=1}^n \left[\sum_{k=0}^{i-1} \sum_{j=2k+2}^{i+1+k} \binom{i+1+k}{j} \frac{(-1)^{j+1}}{2^{i+2+k}} - \sum_{k=0}^i \sum_{j=2k+1}^{i+1+k} \binom{i+1+k}{j} \frac{(-1)^j}{2^{i+2+k}} \right] \end{aligned}$$

We briefly discuss how one arrives at such results by studying the asymptotic behavior of the roots of a generalized Fibonacci polynomial sequence of the form $F_j(x) = x^j - x^{j-1} - \dots - x - 1$. We discuss algebraic as well as computer-generated proofs of such identities. (Received September 15, 2007)