In this paper we present the solution of pair of recurrence relations that subsequently yields various combinatorial identities, involving Fibonacci and Lucas numbers. Let $\alpha_1 = (b + \sqrt{b^2 + 4c})/(2c)$ and $\alpha_2 = (b - \sqrt{b^2 + 4c})/(2c)$ for real numbers $b, c, c \neq 0$. We show how an expression of the form $(\alpha_1^{n+1} - \alpha_2^{n+1})/(\alpha_1 - \alpha_2), n = 0, 1, 2, \ldots$ can be represented in countably many distinct, nontrivial ways, in terms of rational functions and binomial coefficients. (Received September 16, 2013)