Analytic Combinatorics Homework 2 Problem 1

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2/15/2017

Multiplying by $n+1$, we have $(n+1)a_n = na_{n-1} + n + 1$. Let $b_n = (n+1)a_n$. Then $b_0 = 1$ and for $n \geq 1$ we have $b_n = b_{n-1} + n + 1$. Thus $b_n = 1 + 2 + \cdots + (n+1) = \frac{(n+1)(n+2)}{2}$.

Dividing by $n+1$ to find a_n, we obtain $\boxed{a_n = \frac{n+2}{2}}$.