Formulas for the Number of Nondeterministic Dyck Bridges of Length $2n$

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1 Formulas

The included formulas are for OEIS sequence A368164: "Number of nondeterministic Dyck bridges of length $2n$". This sequence is related to the recent work of de Panafieu and Wallner (2023) [1].

$$\text{A368164}(n) = 1 + \sum_{k=0}^{n-1} \frac{2^{n-k}\left(2^n(n+k+1)\binom{2n}{k} + (2k+1)\binom{2n}{n-k}\right)}{n+k+1} \tag{1}$$

$$\text{A368164}(n) = \text{A089022}(n) + \sum_{k=0}^{n-1} \binom{2n}{k} 2^{2n-k} \tag{2}$$

$$\text{A368164}(n) = \sum_{k=0}^{2n} \binom{2n}{k} 2^{2n-k} (-1)^{\lfloor \frac{k}{n+1} \rfloor} \tag{3}$$

$$\text{A368164}(n) = \left((x+2)^{2n} \bmod (x^{n+1}+1)\right) \bmod (x-1) \tag{4}$$

References

[1] Élie de Panafieu and Michael Wallner. Combinatorics of nondeterministic walks, 2023. URL https://arxiv.org/abs/2311.03234.