

FIND N-TH ELEMENT FROM STERN'S DIATOMIC SERIES

<https://www.geeksforgeeks.org/find-n-th-element-from-sterns-diatomic-series/>

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어떤 문제인가?

Given an integer n. we have to find the nth term of Stern's Diatomic Series.

Stern's diatomic series is the sequence which generates the following integer sequence 0, 1, 1, 2, 1, 3, 2, 3, 1, 4, 3, 5, 2, 5, 3, 4, It arises in the **Calkin-Wilf tree**. It is sometimes also known as the **fusc** function.

Examples :

Input : n = 7

Output : 3

Input : n = 15

Output : 4

Calkin–Wilf tree

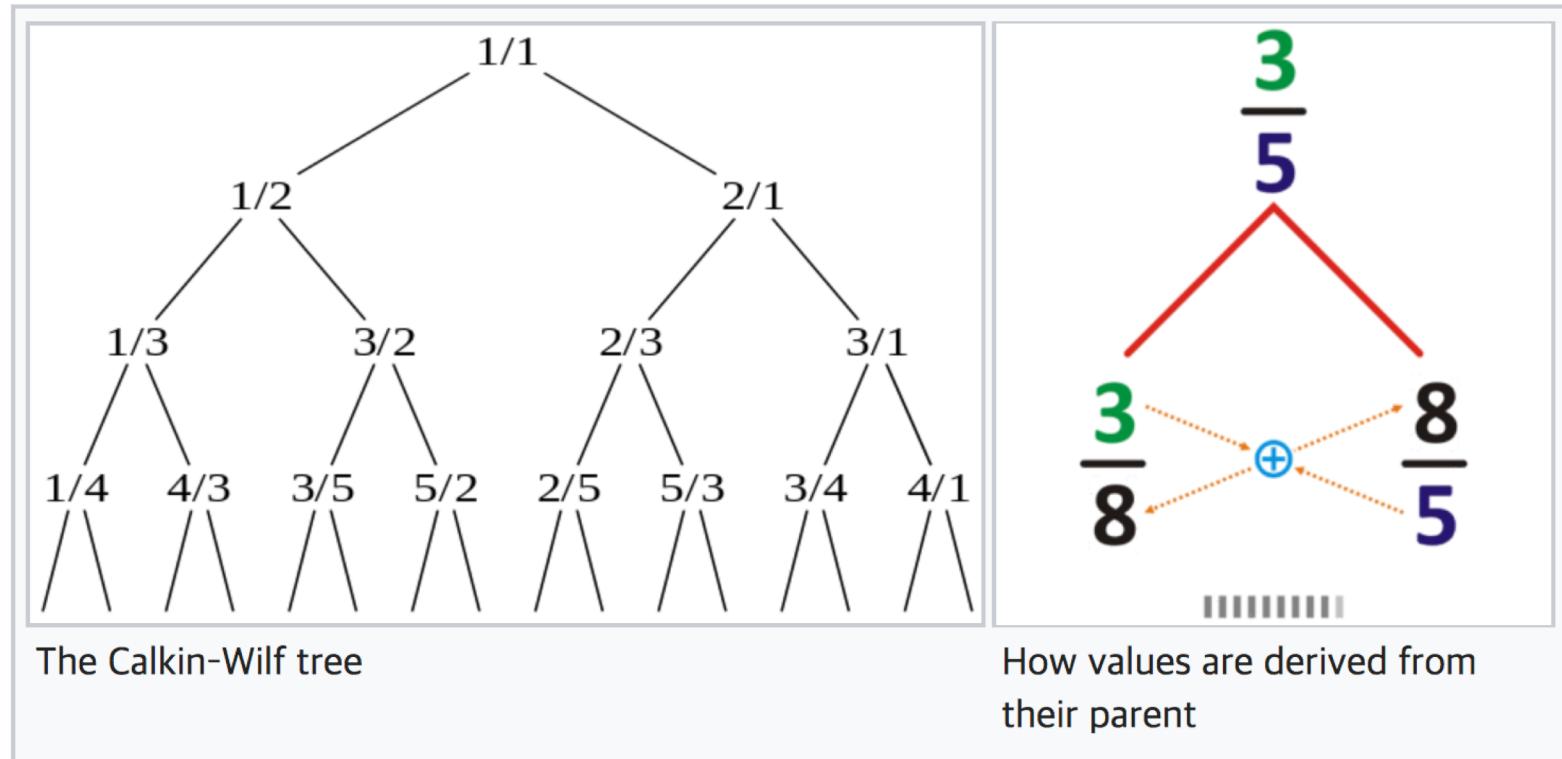
From Wikipedia, the free encyclopedia

In number theory, the **Calkin–Wilf tree** is a tree in which the vertices correspond 1-for-1 to the **positive rational numbers**. The tree is rooted at the number 1, and any rational number expressed in simplest terms as the fraction a/b has as its two children the numbers $a/(a + b)$ and $(a + b)/b$. Every positive rational number appears exactly once in the tree.

The sequence of rational numbers in a **breadth-first traversal** of the Calkin–Wilf tree is known as the **Calkin–Wilf sequence**.

Its sequence of numerators (or, offset by one, denominators) is **Stern's diatomic series**, and can be computed by the **fusco function**.

Stern's Diatomic Series 0, 1, 1, 2, 1, 3, 2, 3, 1, 4,



$$p(n) = p(n/2) \quad \text{for } n \text{ is even}$$
$$p(n) = p((n - 1)/2) + p(n + 1)/2 \quad \text{for } n \text{ is odd}$$

where $p(0) = 0$ and $p(1) = 1$

Stern's Diatomic Series 0, 1, 1, 2, 1, 3, 2, 3, 1, 4,