DP 5 January

Monday, January 5, 2026 10:00

Q Given an nth & find the no of ways n^{th} digit can be digit sum is 10.

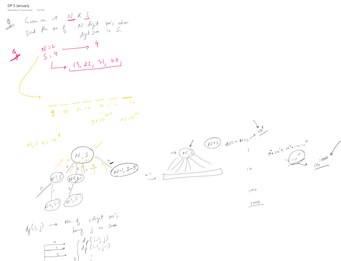
$n=2$, $S=10$ → 7

→ {19, 28, 37, 46}

$g(n) = 10 \cdot 10^{n-1} - 10^{n-1} = 9 \cdot 10^{n-1}$

$g(2) = 90$, $g(3) = 900$

$n, s \le 10^9$



$f_1(n)$ → no of digit sum digit ↓ ↑ 2 sum

$f_1(n)$

$f_1(1)$, $f_1(2)$, $f_1(3)$, $f_1(4)$, $f_1(5)$, $f_1(6)$, $f_1(7)$, $f_1(8)$, $f_1(9)$

Sol 1 (n) 1

$f_1(n) = \sum_{i=1}^{9} f_1(n-i)$

$f_1(n) = \sum_{i=1}^{9} f_1(n-i)$; $f_1(0) = 1$

$f_1(1) = 1$, $f_1(2) = 2$, $f_1(3) = 4$, $f_1(4) = 8$, $f_1(5) = 16$, $f_1(6) = 32$, $f_1(7) = 64$, $f_1(8) = 128$, $f_1(9) = 256$

$f_1(n) = 2^{n-1}$

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$TC \to O(n)$ $SC \to O(n)$

$f_1(n) = \sum_{i=1}^{9} f_1(n-i)$

$f_1(n) = 2^{n-1}$

$TC \to O(1)$ $SC \to O(1)$

Sol 2 (2)

$f_1(n) = \sum_{i=1}^{9} f_1(n-i)$

$f_1(n) = 2^{n-1}$

$TC \to O(n)$ $SC \to O(n)$

$f_1(n) = 2^{n-1}$

$TC \to O(1)$ $SC \to O(1)$

I Fencing Post analogy.

Given no analogy → height & width.

Use analogy to get total analogy.

(h, w), (h, w) → $h \times w$, $h \times w$

find the max no of analogy you can get.

$n \le 10^5$, $h, w \le 10^9$

$(5,3)$, $(5,3)$, $(5,3)$, $(2,3)$