

Homework3-q3

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Please use Substitution method to find Big-O of this relation

$$T(n) = 0 \quad \text{if } n = 1$$
$$T(n) = T(n-1) + n - 1 \quad \text{if } n \geq 2$$

$$T(n) = T(n-1) + n - 1$$
$$= [T(n-2) + (n-1) - 1] + n - 1$$

$$= T(n-2) + 2(n-1) - 2$$

$$= T(n-3) + 3(n-1) - 3$$

$$= T(n-4) + 4(n-1) - 4$$

$$= T(n-5) + 5(n-1) - 5$$

$$= T(n-6) + 6(n-1) - 6$$

...

$$= T(1) + n(n-1) - (1+2+3+\dots+(n-1))$$

$$T(1) + n(n-1) - (1+2+3+\dots+(n-1))$$

$$= 0 + n(n-1) - (n(n-1))/2$$

$$= n(n-1) - (n(n-1))/2$$

$$= (2n(n-1) - n(n-1))/2$$

$$= (n^2 - n)/2$$

$$\text{Big O} = O(n^2)$$