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1. The runtime complexity of algorithm mathematically.

A: Let's count number of operations in terms of the input size "n".

This algorithm contained nested loops.

Innermost loop contains the operation $\underline{x = x+1}$

$\downarrow$

executed $n \times n$ times

$\therefore$ runtime $T(n) = 1 + \sum\limits_{i=1}^{n} \sum\limits_{j=1}^{n} 1$

$T(n) = 1 + \sum\limits_{i=1}^{n} \left(\sum\limits_{j=1}^{n} 1 \right)$

$\therefore$ Inner Summation $\Rightarrow$ Constant

$T(n) = 1 + \sum\limits_{i=1}^{n} n$

$T(n) = 1 + n \sum\limits_{i=1}^{n} 1$

$\therefore \sum\limits_{i=1}^{n} 1 \Rightarrow n$

$T(n) = 1 + n \times n$

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

$\therefore$ Runtime of given algorithm is $O(n^2)$