Hands on - 3

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1) The runtime complexity of algorithm mathematically:

Let's count the no. of basic operations in terms of the input size "n".

Algorithm contains nested loops

innermost loop contains the operation $x = x + 1$

where $x = x + 1$ is executed n^2 times

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

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

$\therefore$ Inner summation $\Rightarrow$ constant

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

$T(n) = 1 + n \times n \quad \because \sum_{i=1}^{n} 1 = n$

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

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