~~t~~ maxInt(): 2

longestBalancedSubstring(): 2

isBalanced: $3 + \sum_{i=0}^{n-1} 1$ $\qquad \sum_{i=0}^{n-1} 1 = n-1+1$

$n+3 \qquad\qquad = n$

lBSfromIndex: ~~3~~ 4 + the loop ~~recursion~~

the loop: $\sum_{i=1}^{n-1} \left(\sum_{j=0}^{i+1} 1 + \sum_{j=0}^{i} 1 + n+3 \right)$

$n+3 \sum_{i=1}^{n-1} 1 + \cancel{\sum_{j=0}^{i+1}} \sum_{i=1}^{n-1} \sum_{j=0}^{i+1} 1 + \sum_{i=1}^{n-1} \sum_{j=0}^{i} 1$

1. $(n+3) \sum_{i=1}^{n-1} 1 = (n+3)(n-1-1+1)$

$(n+3)(n-1) = n^2 + 2n - 3$

2. $\sum_{i=1}^{n-1} \sum_{j=0}^{i+1} 1 = \sum_{i=1}^{n-1} i+1+1 = \sum_{i=1}^{n-1} i = \frac{(n-1)(n+1)}{2} = \frac{1}{2}n^2 + 1$

$2\sum_{i=1}^{n-1} 1 = (n-1-1+1)\, 2$

$= 2n - 2$

$= \frac{1}{2}n^2 + 2n - 1$

3. ~~$\sum_{i=1}^{n-1} \sum_{j=0}^{i} 1 = \sum_{i=1}^{n-1} i+1$~~

3. $\sum_{i=1}^{n-1} \sum_{j=0}^{i} 1 = \sum_{i=1}^{n-1} i+1 = \sum_{i=1}^{n-1} i + \sum_{i=1}^{n-1} 1$

$\frac{1}{2}n^2 + 1 + n - 1 = \frac{1}{2}n^2 + n$

$\therefore 4 + n^2 + 2n - 3 + \frac{1}{2}n^2 + 2n - 1 + \frac{1}{2}n^2 + n = 2n^2 + 5n$

$\simeq O(n^2)$

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

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

$= T(n-3) + (n-2)^2 + (n-1)^2 + n^2$

$T(n-4) + (n-3)^2 + (n-2)^2 + (n-1)^2 + n^2$

$T(1) = 1$

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

$T(n-2) = T(n-3) + (n-2)^2$

$T(n-3) = T(n-4) + (n-3)^2$

$T(n-k) + \sum_{i=1}^{k} (n-i+1)^2$

$T(n-(n-1)) + \sum_{i=1}^{n-1} i^2$

$T(1) + \frac{n \cdot (n-1) \cdot (2n-1)}{6} \simeq \frac{n^3}{6}$

$n - k = 1$

$k = n-1$

$O(n^3)$