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ASSIGNMENT 1

Part 2

1 $\sum_{i=0}^{n+1} 1 = 1+1+1+\cdots n+1 = \boxed{O(n)}$

2 $\sum_{i=0}^{n-1}\sum_{j=0}^{n-1} 1 = \sum_{i=0}^{n-1} n = n^2$ $\boxed{O(n^2)}$

3. $\sum_{i=0}^{n-1}\sum_{j=0}^{i-1} 1 = \sum_{i=0}^{n-1} i = n*i = n*(n-1) \quad \because i=n-1$

$\therefore n^2-n$ $\boxed{O(n^2)}$

4 $\sum_{i=0}^{n^2-1}\sum_{j=0}^{i-1} 1 = n^2 * i \quad \because i = n^2-1$

$\therefore n^2*(n^2-1) = n^4-n^2$

$\boxed{O(n^4)}$

5 $\sum_{i=0}^{n^2-1}\sum_{j=0}^{i-1}\sum_{k=0}^{j-1} 1 = \sum_{i=0}^{n^2-1}\sum_{j=0}^{i-1} j = \sum_{i=0}^{n^2-1} ij = n^2 ij$

$j = i-1$

$= n^2 i(i-1)$

$= n^2(i^2-i) \qquad i=n^2-1$

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

$= n^2(n^4-2n^2+1-n^2+1)$

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

$= n^6-3n^4+2n^2$

$\boxed{O(n^6)}$

6. $\sum_{i=0}^{n-1} \sum_{j=0}^{i^2-1} \sum_{k=0}^{j-1} = n\, i^2 j$ $\qquad j = i^2 - 1$

$n(i^2)(i^2-1)$

$n(i^4 - i^2)$ $\qquad i = n-1$

$n(i^2-i)(i^2+i)$

$n\{(n-1)^2-(n-1)\}\{(n-1)^2+(n-1)\}$

$n(n^2-2n+1-n+1)(n^2-2n+\cancel{1}+n-\cancel{1})$

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

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

$n^5-4n^4+5n^3-2n^2$

$O(n^5)$