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

$T(n)=T(n-1)+n, \; T(1)=1$

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

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

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

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

$T(n)=T(n-k)+\left(\sum_{i=0}^{k-1}(n-k+1+i)\right)$

$k=n-1$

$T(n)=T(1)+\left(\sum_{i=0}^{n-2}(2+i)\right)$

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

$=\frac{(n-2)(n-1)+4(n-1)}{2}$

$=\frac{(n-1)(n+2)}{2}$

$T(n)= 1+\frac{(n-1)(n+2)}{2}$

$T(n) = \frac{n^2+n}{2}$

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

Substituting Equations

n → n-1

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

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

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