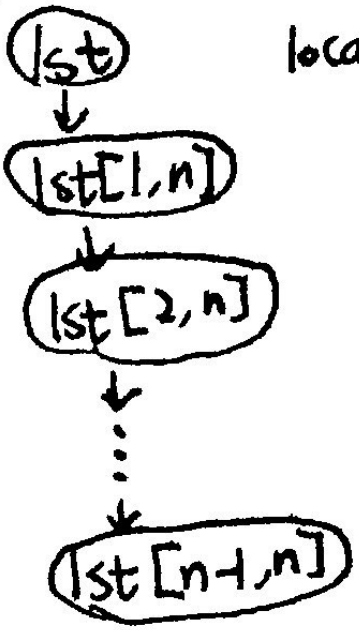
Q1:

① n means len(lst).

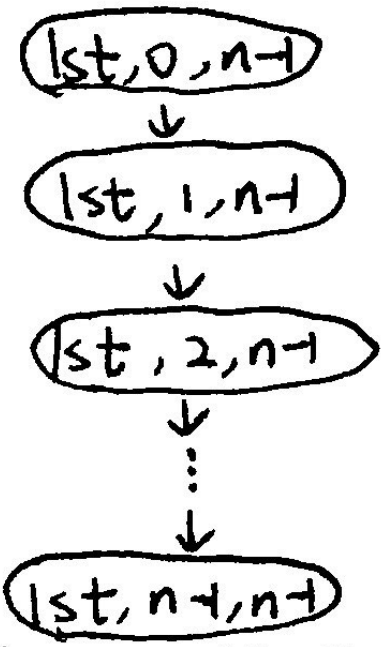


local cost: n, n-1, n-2, ..., 1

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

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

② n means len(lst)



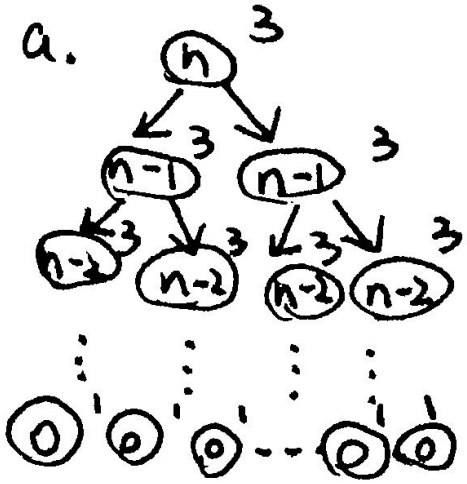
local cost: 2, 2, 2, ..., 1

$T(n) = 2 \times (n-1) + 1 = 2n-1 = \Theta(n)$

Version 2 is asymtotically faster. Because $\Theta(n) < \Theta(n^2)$.

Q2:

a.

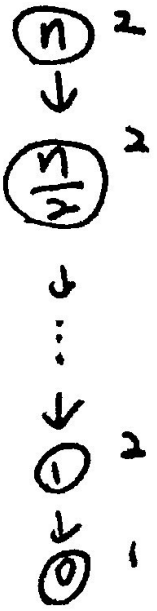


$T(n) = 2^n + (1+2+4+\cdots+2^{n-1}) \times 3$

$= 2^{n+2} - 3 = \Theta(2^n)$

$\Theta(2^n)$

b.

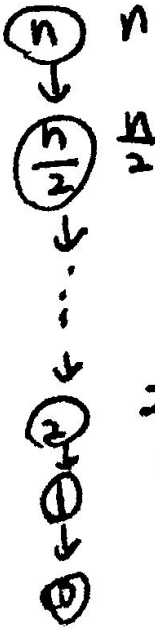


$T(n) = 2 \times (\log_2 n + 1) + 1$

$= 2\log_2 n + 3 = \Theta(\log n)$

$\Theta(\log n)$

c.



$T(n) = \log_2 n +$ [illegible]

$1+1+2+4+\cdots+n$

$= 2n + \log_2 n$

$= \Theta(n)$

$\Theta(n)$