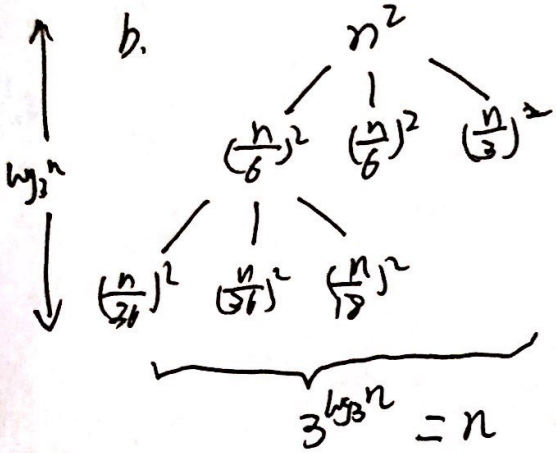
Q2: a. $T(n) = \sum_{i=2}^{n} i^2 + T(\frac{n}{6}) + T(\frac{n}{3}) + T(\frac{n}{6})$

$= 2T(\frac{n}{6}) + T(\frac{n}{3}) + \Theta(n^2)$

b.

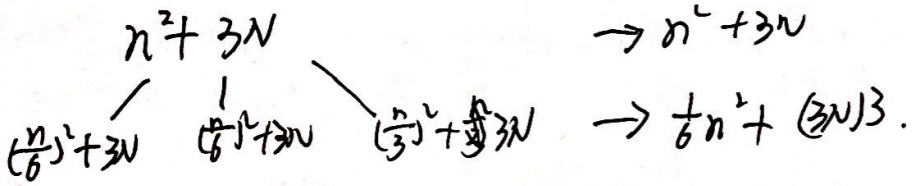


$T(n) = \sum_{i=0}^{\log_3 n - 1} \frac{1}{6^i} n^2 + \Theta(n)$

$\leq n^2 \frac{1}{1-\frac{1}{6}} + \Theta(n)$

$= \Theta(n^2)$

C. $T(n) = 2T(\frac{n}{6}) + T(\frac{n}{3}) + \Theta(n^2) + 3N$,



$T(n) = \sum_{i=0}^{\log_3 n - 1} \frac{1}{6^i} n^2 + \sum_{i=1}^{\log_3 n} (3N) \cdot 3^i + \Theta(n)$

$\leq n^2 \cdot \frac{1}{1-\frac{1}{6}} + 3N \sum_{i=1}^{\log_3 n} 3^i + \Theta(n)$

$= \frac{6}{5} n^2 + 3N \frac{3(1-3^{\log_3 n})}{1-3} + \Theta(n)$

$= \frac{6}{5} n^2 + 3N \cdot \frac{3}{2}(1-n) + \Theta(n)$

$= \Theta(n^2)$

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