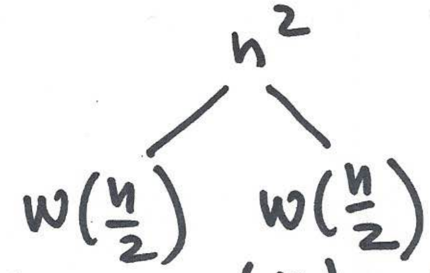
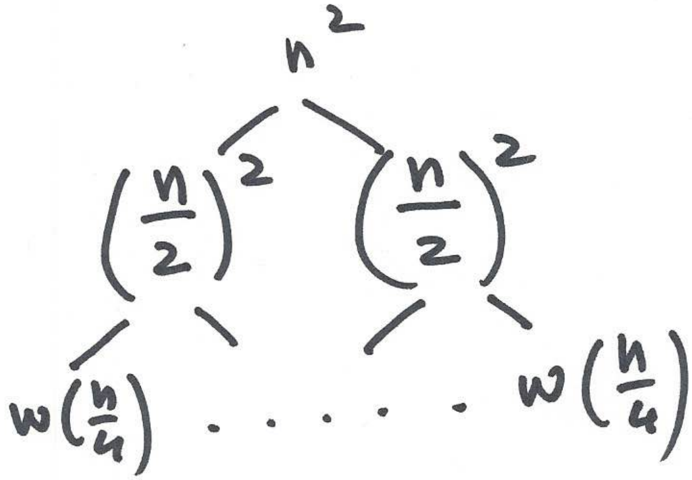
$$w(n) = 2w\left(\frac{n}{2}\right) + n^2$$



$$L = 2w\left(\frac{n}{4}\right) + \left(\frac{n}{2}\right)^2$$



		pb. size	# prob.
level 0:	n^2	n	1
level 1:	$\left(\frac{n}{2}\right)^2 \quad \left(\frac{n}{2}\right)^2$	$\frac{n}{2}$	2
level 2:	$\left(\frac{n}{4}\right)^2 \dots \left(\frac{n}{4}\right)^2$	$\frac{n}{4}$	$4 = 2^2$
level i:	$\boxed{\left(\frac{n}{2^i}\right)^2}$ 1 problem	$\frac{n}{2^i}$	2^i
last level	$w(1) \dots\dots\dots w(1)$	$\boxed{\frac{n}{2^i} = 1}$	$2^{\log_2 n}$

$$\Rightarrow i = \log_2 n$$

$$w(n) = \sum_{i=0}^{\log_2 n - 1} 2^i \cdot \left(\frac{n}{2^i}\right)^2 + 2^{\log_2 n} \cdot w(1)$$

$$\boxed{2^i \cdot \frac{1}{(2^i)^2} = \frac{1}{2^i}}$$

$$\rightarrow n^{\log_2 2} = n$$

$$w(n) = n^2 \sum_{i=0}^{\log_2 n-1} \frac{1}{2^i} + n \cdot w(1)$$

$$\sum^{\infty} x^i = \frac{1}{1-x}$$

$$x < 1$$

$$\leq n^2 \cdot \sum_{i=0}^{\infty} \frac{1}{2^i} + n \cdot w(1)$$

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

constant

$$= O(n^2)$$

$$w(n) = \Theta(n^2)$$

$$T(n) = 3 \cdot T\left(\frac{n}{4}\right) + cn^2$$

		pb. size	# problems
level 0 :	cn^2	n	1
level 1 :	$c\cdot\left(\frac{n}{4}\right)^2 \quad c\left(\frac{n}{4}\right)^2 \quad c\left(\frac{n}{4}\right)^2$	$\frac{n}{4}$	3
level 2 :	. . . .	$\frac{n}{4^2}$	3^2
⋮		⋮	⋮
level i :	1 problem $\boxed{c\cdot\left(\frac{n}{4^i}\right)^2}$	$\frac{n}{4^i}$	$\boxed{3^i}$
⋮			
last level	$T(1)\ T(1) \ldots\ldots T(1)$	$\frac{n}{4^i} = 1 \Rightarrow \boxed{i = \log_4 n}$	

*

$$T(n) = \sum_{i=0}^{\log_4 n - 1} c\cdot\left(\frac{n}{4^i}\right)^2 \cdot 3^i + 3^{\log_4 n}\cdot T(1)$$

$$n^{\log_4 3}$$

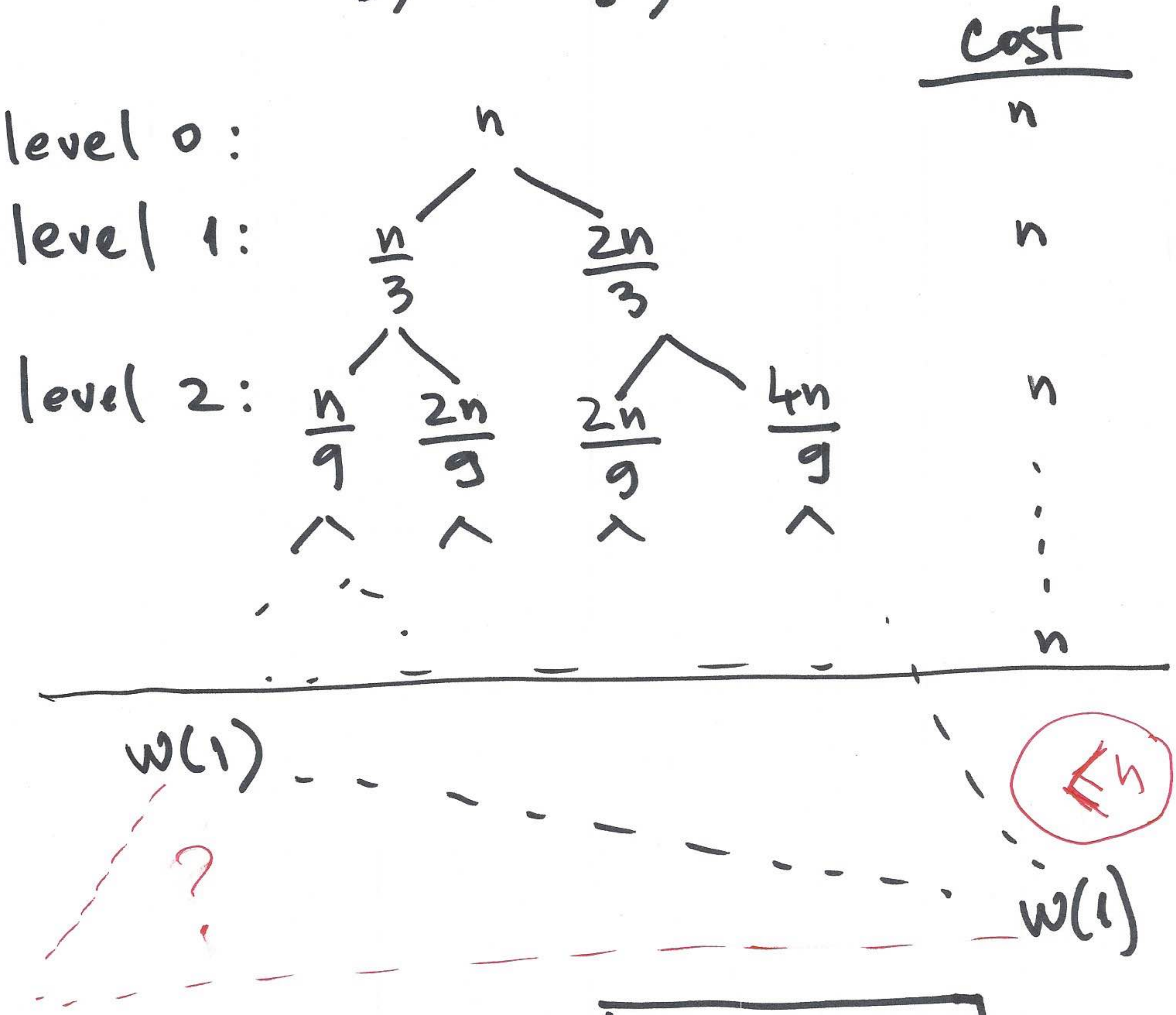
$$= c\cdot n^2 \sum_{i=0}^{\log_4 n - 1}\left(\frac{3}{16}\right)^i + n^{\log_4 3}\cdot T(1)$$

$$\leq c\cdot n^2 \sum_{i=0}^{\infty}\left(\frac{3}{16}\right)^i + n^{\log_4 3}\cdot T(1)$$

$$= c\cdot n^2 \frac{1}{1-\frac{3}{16}} + n^{\log_4 3} T(1) = \Theta(n^2)$$

constant

$$W(n) = W\left(\frac{n}{3}\right) + W\left(\frac{2n}{3}\right) + n$$



$$\left(\frac{2}{3}\right)^i n = 1 \Rightarrow \boxed{i = \log_{3/2} n}$$

$$W(n) \leq \underbrace{n + n + \dots + n}_{\text{all levels}} = n \cdot \log_{3/2} n =$$

$$= O(n \lg n)$$