em & Time Complexity

$T(\frac{n}{b}) + f(n)$ Master Theorem

input
of subproblems
by ~~split~~ which subproblem is reduced
ch to recombine/split everything back

n^c), if $\log_b a > c$, then

$g_b a$), $T(n) = \Theta(n^{\log_b a} \times \log n)$

and $\log_b a \leq c$, then

, $O(n \log n)$, $O(n)$, $O(\log n)$

1. $3T(\frac{n}{2}) + n^2$ $c=3$

$\log_2 3 > 3$ not case 3

$\Omega(n^1)$ $\log_2 3 > c$ $c=1$

$\Theta(n^2)$ case 3

2. $7T(\frac{n}{2}) + n^2$

$\log_2 7 > 2 \rightarrow \Theta(n^{\log_2 7})$ case 1

3. $4T(\frac{n}{2}) + n^2$

$\Theta(n^2)$ case 3

$\log_2 4 = 2 \rightarrow \Theta(n^2 \times \log n)$ case 2

4. $\log_4 3$ $n \log n$

$\Omega(n^1) = n \log n$

$\log_4 3 < 1 \rightarrow \Theta(n \log n)$ case 3

5. $\log n$ $\log$ $c = 1$

$\log_2 4 > 1 \rightarrow \Theta(n^2)$ case 1

⑥ $T(n-1)+n$

$\frac{n}{b} = n-1$ $\quad \frac{n}{b} - \frac{n-1}{b}$

$n = bn - b$

$(b-1)$

$(1-b)n = -b$ $\quad \frac{bn-n-b}{b}$

$n = \frac{-b}{1-b}$

$\frac{n-(n-1)b}{b}$ Can't with MT

⑦ $4T(\frac{n}{2}) + n^2 \log n$

$n^2 \log n = O(n^2)$ & $\Omega($

↳ $O(n^2) * O(n)$

~~$\Theta(n^3)$~~ $p=1$

$\Theta(n^c \log^p n)$

$\Theta(n^2 \log^{(1+1)} n)$

$\Theta(n^2 \log^2 n)$ case 2 extended

⑧ $5T(\frac{n}{2}) + \frac{n}{\log n}$ $\quad p=-1$

~~$n \log \log n$~~

$\log_2 5 > 1$

$\Theta(n^{\log_2 5})$ case 1

⑨ $3T(\frac{n}{3}) + \frac{n}{\log n}$

~~$\frac{n}{\log n} = n \log^{-1} n$~~

$O(n) = \frac{n}{\log n}$

$\log_3 3 = 1 \rightarrow p = -1$

$n \log \log n$ MT doesn't work

⑩ $2T(\frac{n}{4}) + c$

$O(n^1)$

$\log_4 2 < 1 \rightarrow \Theta(f(n)) = \Theta(c)$

⑪ $T \log_2$ $\quad T(\frac{n}{4}) + \log n$

$\log_4 1$ $\quad c=0$ $\quad \Theta(n^{\log_4 1})$

$\log_4 1 > 0$

all the things

(12) Doesn't Apply

(13) $\neq$ $\log_4 2 < 1$

case 1

$\Theta(n^{1/2})$

$\log$

$\Theta(n^{k} \log^{p} n)$

$k = 1$

$p = 1$

$\Theta(n \log n)$

all the things