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1.

a) $T(n) = 4T(n/2) + n \Rightarrow$ ~~a=4, b=2,~~

- $a=4, b=2, f(n)=n$
- $n^{\log_b a} \Rightarrow n^{\log_2 4} = \Theta(n^2)$
- $\Theta(n^2) \Longleftrightarrow f(n) \Rightarrow \Theta(n^2) \Longleftrightarrow n$ // Karşılaştırıyoruz

$f(n) = O(n^{\log_b a - \varepsilon})$ için $T(n) = \Theta(n^{\log_b a}) \Rightarrow T(n) = \Theta(n^2)$

b) $T(n) = 4T(n/2) + n^2$

- $a=4, b=2, f(n)=n^2$
- $n^{\log_b a} = n^{\log_2 4} = \Theta(n^2) \Rightarrow \Theta(n^2) \Longleftrightarrow f(n)$ Karşılaştırıyoruz

$f(n) = O(n^{\log_b a})$ için $T(n) = \Theta(n^{\log_b a} \log n)$

$\Rightarrow T(n) = \Theta(n^2 \log n)$

C) $T(n) = 4T(n/2) + n^3$

- $a=4, b=2, f(n)=n^3$
- $n^{\log_b a} = \Theta(n^2) \Rightarrow \Theta(n^2) \Longleftrightarrow f(n)$

$f(n) = \Omega(n^{\log_b a + \varepsilon})$ ✓

$af(n/b) \leq cf(n) \Rightarrow 4f(n/2) \leq f(n)$ ✓

$f(n) = \Omega(n^{\log_b a + \varepsilon})$ için $T(n) = \Theta f(n) \Rightarrow$ ~~$T(n) = \Theta(n^3)$~~ $\Rightarrow T(n) = \Theta(n^3)$

D) $T(n) = 4T(n/2) + 1$

- $a=4, b=2, f(n)=1$
- $n^{\log_4 2} = n^2 \Rightarrow \Theta(n^2) \Longleftrightarrow f(n) \Rightarrow \Theta(n^2) \Longleftrightarrow 1$

$f(n) = O(n^{\log_b a - \varepsilon})$ için $T(n) = \Theta(n^{\log_b a}) \Rightarrow T(n) = \Theta(n^2)$

E) $T(n) = 4T(n/2) + (1/n)$

$a=4, b=2, f(n) = n^{-1}$

$d=-1$ olduğu için master teoremi ile çözülemez

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2)

	işlem	tekrar
input: n	c1	1
k=0	c2	1
for (i=n/2; i<n; i++){	c3	$\frac{n}{2}+1$
for(j=1; j<n; j=j*2){	c4	$\sum_{j=1}^{n}(j*2)+1$
k=k+n/2		
}	c5	$\sum_{j=1}^{n}(j*2)$
}		

$$T(n) = c_1 + c_2 + c_3\left(\frac{n}{2}+1\right) + c_4\sum_{j=1}^{n}(j*2+1) + c_5\sum_{j=1}^{n}(j*2)$$

$n = \frac{n}{2}+1 \;/\; k = \Theta(n\log n)$

$\Rightarrow k = \frac{n}{2} + \frac{n}{2} + \dots \log n$ kere $\Rightarrow \frac{n}{2}\log n$

$\Rightarrow \frac{n}{2}\log n + \frac{n}{2}\log n + \dots (\frac{n}{2}+1)$ kere

$\Rightarrow (\frac{n}{2}+1).\frac{n}{2}\log n$

$\Rightarrow T(n) = \Theta(n^2\log n)$

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3) [illegible]

$\Rightarrow 1 < 1000 < \log\log n < \log n < \sqrt{n} < n^{3/4} < n < n\log n < n^2 < 2^n < 2^{n^2} < n!$