Clrs solutions

Saturday, April 9, 2022 9:50 AM

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

$a = 1$ $f(n) = 1$ $\epsilon = .5$

$b = 4$

$n^{\log_4 2} = n^{.5}$ 1) $1 = O(n^{.5-.5})$

~~3) $1 = \Omega(n^{.5+\epsilon})$~~

~~2) $1 = n^{.5}$~~

$T(n) = \Theta(n^{.5})$

$= \Theta(\sqrt{n})$

4.5-1b)

$T(n) = 2T(n/4) + \sqrt{n}$

$a = 1$ $f(n) = \sqrt{n}$

$b = 4$

1) $\sqrt{n} = O(n^{\log_4 2 - \epsilon}) = O(n^{.5-\epsilon})$

false n $\epsilon > 0$ to satisfy as $\sqrt{n} = n^{.5}$

2) $\sqrt{n} = \Theta(n^{\log_4(2)})$ true as $\sqrt{n} = n^{.5}$

possible case

3) $\sqrt{n} = \Omega(n^{\log_4 2 + \epsilon}) = \Omega(n^{.5+\epsilon})$

false

no $\epsilon > 0$ as $\sqrt{n} = n^{.5}$

$T(n) = \sqrt{n}\lg(n)$

4.5-1-c)

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

$a = 2$ $f(n) = n$

$b = 4$

$n^{\log_4 2} = n^{.5}$

1) $n = O(n^{\log_4 2 - \epsilon})$

$= O(n^{.5-\epsilon})$

false

no epsilon

2) $n = \Theta(n^{.5})$

false

3) $n = \Theta(n^{.5+\epsilon})$

$\epsilon = .5$

$n = \Theta(n^{.5+.5})$

~~f(n) =~~ check regularity

$af(n/b) \le c\,f(n/b)$

$2\frac{n}{4} \le c\frac{n}{4}$

$c = 2$

true

$T(n) = \Omega(n^{.5})$

$= \Omega(\sqrt{n})$

4.5-1-d)

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

~~1)~~ $a = 2$ $f(n) = n^2$

$b = 4$

1) $n^2 = O(n^{.5-\epsilon})$

false

no epsilon

2) $n^2 = \Theta(n^{.5})$

false

3) $n^2 = \Omega(n^{.5+\epsilon})$

$\epsilon = 1.5$

$= \Omega(n^{.5+1.5})$

$af(n/b) \le cf(n/b)$

$2\frac{n^2}{4} \le c\frac{n^2}{4}$

$c = 2$

true

~~$T(n) = n^2$~~

$T(n) = \Omega(n^{.5})$

4.5-2)

$2.8073 = \log_4(a)$

$a = 4^{2.8073}$

(48)

4.5-3)

$a = 1$ ~~$f(n) = 1$~~

$b = 2$

~~$1 = O(n^{\log_2(1) - \epsilon})$~~

$\epsilon = .3$