Duțu Alin Călin
323CD
2.2.2021

Examen AA

(2) $T(n) = 3 \cdot T(3n/10) + n \cdot \sqrt{n} - O(n)$

$a = 3$ $a, b > 1 \Rightarrow$ Se poate aplica Master

$b = \frac{10}{3}$

~~$f(n) = n\sqrt{n} - O(n)$~~

~~$T(n) \geq$~~

~~$O(n) > c_1 \cdot n \Leftrightarrow T(n) \geq 3 \cdot T\left(\frac{3n}{10}\right) + n\sqrt{n} - c_1 n$~~

$O(n) > c_1 \cdot n \Leftrightarrow -O(n) < -c_1 \cdot n \;\; | + \left(3T\left(\frac{3n}{10}\right) + n\sqrt{n}\right)$

$\Leftrightarrow T(n) < 3T\left(\frac{3n}{10}\right) + n\sqrt{n} - c_1 n$

$f(n) = n\sqrt{n} - c_1 \cdot n$

Comparăm $n^{\log_b a}$ cu $n(\sqrt{n} - c_1)$

$n^{\log_{\frac{10}{3}} 3}$? $n^{\frac{3}{2}} - c_1 \cdot n$ $\lim_{n \to \infty} \frac{n^{\log_{\frac{10}{3}} 3}}{n^{\frac{3}{2}} - c_1 \cdot n} = \frac{n^{0,9112485}}{n(\sqrt{n} - c_1)} = 0$

$\Rightarrow$ Se aplică cazul 3 de Master $\Rightarrow f(n) \in \Omega(n^{\log_b a + \varepsilon})$

$a \cdot f\left(\frac{n}{b}\right) \leq c \cdot f(n) \Leftrightarrow 3 \cdot f\left(\frac{3n}{10}\right) \leq c \cdot f(n) \Leftrightarrow 3\left(\frac{3n}{10}\sqrt{\frac{3n}{10}} - c_1 \frac{3n}{10}\right)$

$\leq c \cdot n\sqrt{n} - c_1 \cdot n \Leftrightarrow \frac{9n}{10}\sqrt{\frac{3n}{10}} - c_1 \frac{9n}{10} \leq c(n\sqrt{n} - c_1 n)$

$$c \geq \frac{\frac{9n}{10}\left(\sqrt{\frac{3n}{10}} - c_1\right)}{n(\sqrt{n} - c_1)} \Rightarrow c \geq \frac{9}{10} \cdot \frac{\sqrt{\frac{3n}{10}} - c_1}{\sqrt{n} - c_1} \Rightarrow$$

$$\Rightarrow c \geq \frac{\frac{9}{10} \cdot \left(\sqrt{\frac{3n}{10}} - c_1\right)}{\sqrt{n} - c_1} \Leftrightarrow c \geq \frac{9}{10} \cdot \frac{\sqrt{3}}{\sqrt{10}} \Leftrightarrow c \geq \frac{9\sqrt{3}}{10\sqrt{10}}$$

Dar $c < 1 \Rightarrow \exists\, c \in \left[\frac{9\sqrt{3}}{10\sqrt{10}}, 1\right)$ aî $\forall\, n \geq n_0 \quad a \cdot f\left(\frac{n}{b}\right) \leq c \cdot f(n)$

$\Rightarrow T(n) \in \Theta(f(n)) \Rightarrow T(n) \in \Theta(n\sqrt{n})$

③ $P(l_1)$: unique (l_1) && unique $(l_2) \rightarrow$ (unique (intersection (l_1, l_2))),
$\forall\, l \in$ LIST<T>

CB
$P([\,])$: unique $([\,])$ && unique $(l_2) \rightarrow$ (unique (intersection $([\,], l_2)$))
U_1
$(\Leftrightarrow)$ true && unique $(l_2) \rightarrow$ (unique $([\,])$) $\Rightarrow$

true && unique $(l_2) \rightarrow$ true (A)

Fie
$P(L)$ (A)
Dem $P(x:xs)$ (A)

unique $(x:xs)$ && unique $(l_2) \rightarrow$ unique (intersection $(x:xs, l_2)$)
U_2, I_2, I_3
$(\Leftrightarrow)$ ~~unique~~ !member (x, xs) && unique (xs) && unique $(l_2) \rightarrow$
~~unique~~ (x: intersection (xs, l_2), if member (x, l_2) || intersection (xs, l_2)
if !member (x, l_2)

I $x \in x_1$

$\Leftrightarrow$ false && unique (x_1) && unique $(l_2) \rightarrow$ ~~true~~ true

~~A~~ $\Leftrightarrow$ false $\rightarrow$ true (A)

II $x \notin x_1$ și $x \in$ ~~l~~l_2

$\Leftrightarrow$ true && unique (x_1) && unique $(l_2) \rightarrow x$: intersection (x_1, l_2)

~~Demonstrăm~~

~~a~~

~~unique $(x : x_1)$ && unique (l_2)~~

II $x \notin x_1$ și $x \in l_2$

$\Leftrightarrow$ true && unique (x_1) && unique $(l_2) \rightarrow$ intersection (x_1, l_2)

① mat [ ] [ ]
for i = 1 : n
for j = 1 : m
mat [ ] [ ] = choice (-N ... N) // se citesc elementele matricii

~~sum [ ]~~
~~for i = 1 :~~

sum [ ] / while (j < m)
j = 0
for i = 1 : n
sum [j] += ~~mat~~ mat [i, j] // suma coloanelor
j++

~~for i~~
suma = 0
While (sum < s)
i = 0
suma += sum i
i++
k = i

if (suma == s)
succes

~~while~~
suma = sum [k-1]

for l = k : j
m = 0
if (suma + sum [i] == s)
succes
fail

if m == k
break
m ++

5 /