Tutorial 2

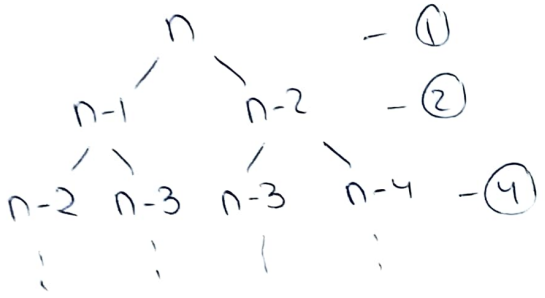
Aryan Gupta
Section B

Ans1 ⇒ Here answer will be $O(\sqrt{n})$.

Ans2 ⇒ Recurrence relation is ⇒

$$T(n) = T(n-1) + T(n-2) + 2$$

⇒ making recurrence tree ↓



⇒ $1 + 2 + 4 + \cdots 2^n$

Here $a = 1, r = 2$

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

$\therefore O(2^{n+1}) = O(2 * 2^n)$

⇒ $O(2^n)$

⇒ space comp. ⇒ $O(n)$

Ans3 ⇒ ① $n \log n$

② n^3

③ $\log(\log(n))$

Ans4 ⇒ $T(n) = T(n/4) + T(n/2) + e^{n^2}$

Lets assume ⇒ $T(n/2) \Rightarrow T(n/4)$

$\therefore T(n) = 2T(n/2) + cn^2$

$\Rightarrow$ applying masters method $\Rightarrow$

$a = 2, b = 2$

$\Rightarrow c = \log_b a \Rightarrow \log_2 3 = 1$

$n^c = n$, $f(n) = n^2$

$\therefore \Theta(n^2)$

as $T(n) <= \Theta(n^2)$

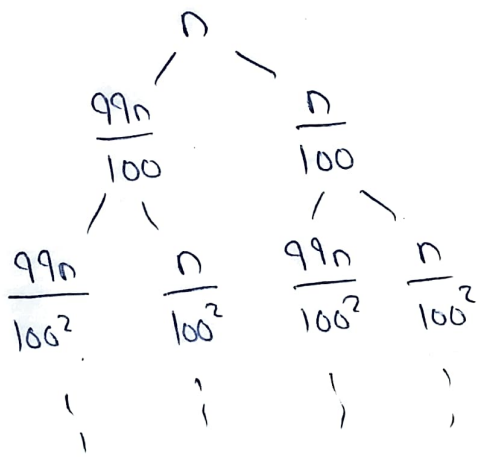
$T(n) = \Theta(n^2)$

Ans5 $\Rightarrow$ $O(n \log n)$

Ans6 $\Rightarrow$ if k is const. greater than 1

then T.C. $= O(\log \log n)$

Ans7 $\Rightarrow$ Here $T = T(99n/100) + T(n/100)$



$\Rightarrow$ if we take longer branch

i.e. $99n/100$

T.C. $\Rightarrow \log_{\frac{100}{99}} n \simeq \log n$