DAC - Part II

Complete Course on Algorithm for GATE - CS & IT

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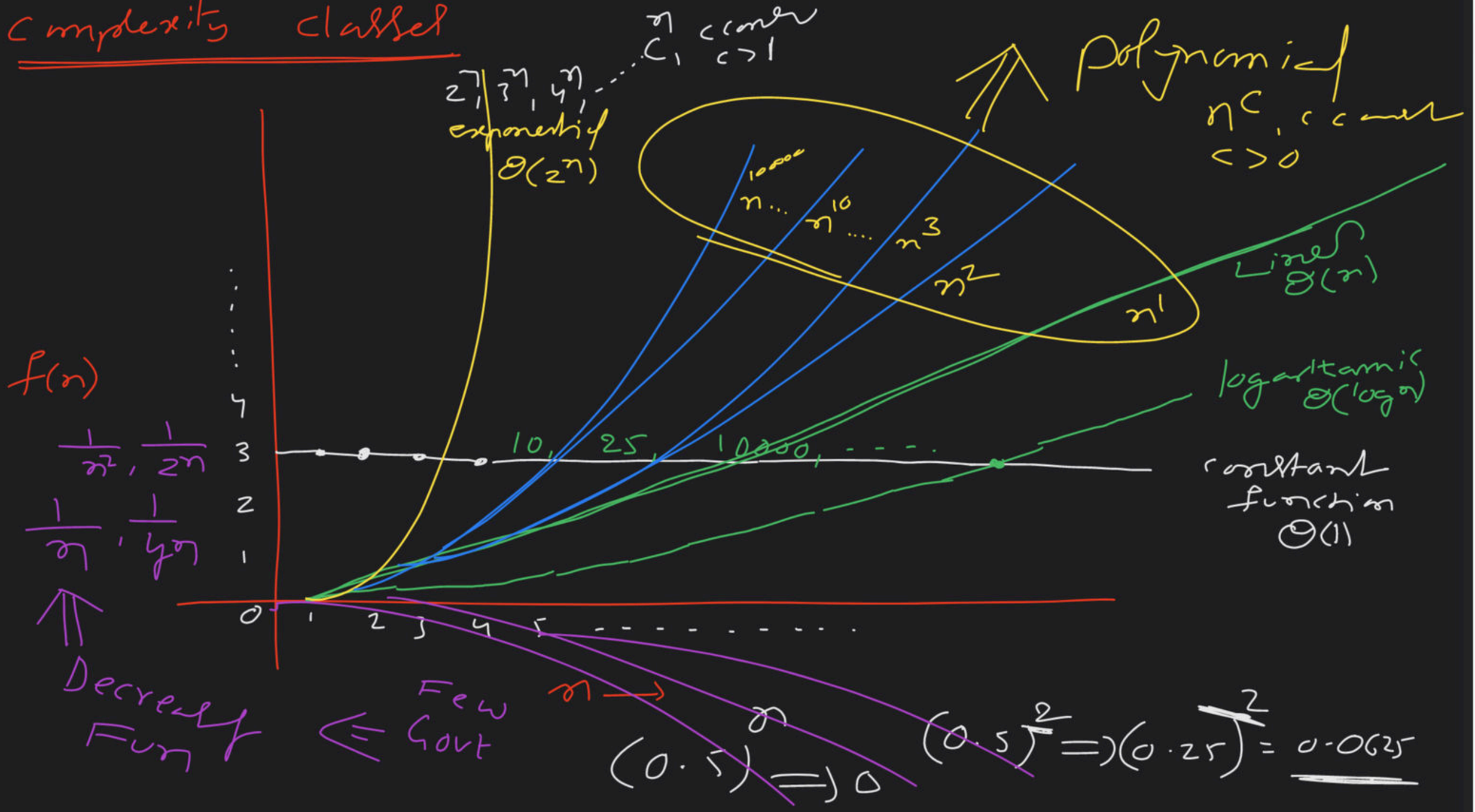
Complexity classes



① decreasing < constant < logarithmic < [linear < quadratic < cubic < ---- polynomial] < exponential.

② $2^n < n^n$

$\underbrace{2 \cdot 2 \cdot 2 \cdot 2 \cdots 2}_{n\text{-times}} < \underbrace{n \cdot n \cdot n \cdot \cdots n}_{n\text{-times}}$

$n! > 2^n$

$\underbrace{n(n-1)(n-2)(n-3)\cdots 2 \cdot 1}_{n} > \underbrace{2 \cdot 2 \cdot 2 \cdots 2}_{n}$

$\Rightarrow 2^n < n! < n^n$

$n! < n^n$

$n \cdot (n-1) \cdot (n-2) \cdots 2 \cdot 1 < \underbrace{n \cdot n \cdot n \cdots n}_{n}$

$2^n = O(n!)$, ~~$2^n = \Omega(n!)$~~, ~~Θ~~

$(\lg n)2$

$n! = O(n^n)$, ~~Ω~~ $\Longrightarrow$ ~~Θ~~

$\lg\lg n$

$2^n = O(n^n)$, Ω $\Longrightarrow$ ~~Θ~~

③ $\lg n < n$

$(\lg n)^2 < n$

$(\lg n)^3 < n$

$(10)^2$

$\lg$

$\lg 2^{1000}$

2

1000

10

$(\lg n)3$

n

$\lg\lg n < \lg n$

$$(\log n)^{10} < n$$

$$(\log n)^{100} < n$$

$$\vdots$$

$$(\log n)^{\log n} > n$$