

① Ajvón, ② Gajser, ③

Asymptotics

- Use slides

- Monotonicity, strict monotonicity

- Floors & ceilings

- exponent laws

$$n^b = o(a^n)$$

- logs: $\lg n$, $\ln n$, $\lg^k n$, $\lg \lg n$

$$a = b^{\log_b a} \quad \log a, \quad \log a/b, \quad \log_{b^k} a$$

$$\log^b n = o(n^a)$$

- Function iteration

$$f^{(i)}(n) = \begin{cases} n, & \text{if } i=0 \\ f(f^{(i-1)}(n)), & i>0 \end{cases}$$

$$\text{e.g. } f(n) = 2n \rightarrow f^{(i)}(n) = 2^i n$$

$$\lg^* n = \min \{ i \geq 0 : \lg^{(i)} n \leq 1 \}$$

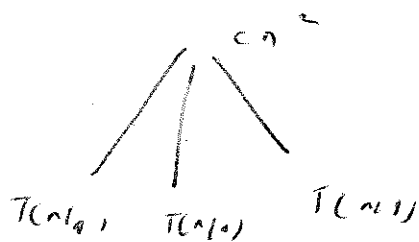
$$\lg^* (2^{65536}) = 5$$

$$\lim_{n \rightarrow \infty} \frac{n}{a^n} = 0 \quad \lim_{n \rightarrow \infty} \frac{b \log n}{n \log a} = 0$$

$$\lim_{n \rightarrow \infty} \frac{\log_{b^k} n}{n^a} = 0$$

Recursion tree method

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



$$T(1) = 0$$

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

