CS310: ALGORITHMS AND

DATA STRUCTURES

Review: Asymptotic Notations

- □ T(n) has same rate of growth as $f(n) => \Theta(f(n))$, O(f(n)) and $\Omega(f(n))$
- T(n) has larger rate of growth as f(n) => Ω(f(n)),
 ψ(f(n))
- T(n) has smaller rate of growth as f(n) =>O(f(n)), o(f(n))

Determine Rates of Growth I

- How do we find the rate of growth of T(n) compared with f(n)?
- □ Compute limit of the ratio T(n)/f(n) as n -> ∞
- If the result is some finite positive constant then the rates of growth are the same
- \square Example: an²+bn+c has the same rate of growth as n²

Determine Rates of Growth II

- How do we find the rate of growth of T(n) compared with f(n)?
- □ Compute limit of the ratio T(n)/f(n) as $n \rightarrow \infty$
- If the result is equal to 0, then it means T(n) has a smaller rate of growth than f(n)
- \Box Example: an²+bn+c has smaller rate of growth than n³

Determine Rates of Growth III

- How do we find the rate of growth of T(n) compared with f(n)?
- □ Compute limit of the ratio T(n)/f(n) as $n \rightarrow \infty$
- □ If the result is equal to ∞, then it means T(n) has a larger rate of growth than f(n)
- \Box Example: an²+bn+c has a larger rate of growth than n

Exercises

$$\Box$$
 Prove (n²/2) – 3n is $\Theta(n^2)$

- □ Is log n = O(n)?
- □ Is log n = O(n^{1/2})?