Computer Science Notes

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Zach Leach

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The University of Texas at Dallas

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Preface

These are my exam review notes taken throughout the Spring semester. $\,$

February 5, 2024 Zach Leach

Part I Computer Networks

Part II Advanced Algorithms

Assignment 1

Assignment 2

- 3.1 Are either $\lceil \lg n \rceil$! or $\lceil \lg \lg n \rceil$! polynomially bounded? Polynomially bounded means
- 3.2 Use induction to prove $F_i = \frac{\phi^i \hat{\phi}^i}{\sqrt{5}}$; where $F_i = F_{i-2} + F_{i-1}$, and ϕ is the golden ratio $\frac{1+\sqrt{5}}{2}$.
- 3.3 Show that $k \lg k = \Theta(n)$ implies $k = \Theta\left(\frac{n}{n \ln n}\right)$.
- 3.4 Are either 2^{n+1} or 2^{2n} big-O of 2^{n} ?
- 3.5 For each pair of functions (A,B), indicate whether A is O,o,Ω,ω , or Θ of B. Assume $k \geq 1$, $\epsilon > 0$, c > 1 are constants.

A	\boldsymbol{B}	0	0	Ω	ω	Θ
$\lg^k n$	n^{ϵ}	yes	yes	yes	yes	yes
n^k	c^n	yes	yes	yes	yes	yes
\sqrt{n}	$n^{\sin n}$	yes	yes	yes	yes	yes
2^n	$2^{n/2}$	yes	yes	yes	yes	yes
$n^{\lg c}$	$c^{\lg n}$	yes	yes	yes	yes	yes
$\lg(n!)$	$\lg(n^n)$	yes	yes	yes	yes	yes
\boldsymbol{A}	\boldsymbol{B}	yes	yes	yes	yes	yes

3.6 Order the following functions such that $f_1 = \Omega(f_2)$, $f_2 = \Omega(f_3)$, ..., $f_{29} = \Omega(f_{30})$, and partition them into equivalence classes such that each function is big- Θ of each other.

Part III Software Engineering

Part IV Operating Systems