Computer Science Notes

Spring 2024

Zach Leach

Draft February 5, 2024

The University of Texas at Dallas

Contents

Preface

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

February 5, 2024

Zach Leach

Part I

Computer Networks

Exam 1

Part II

Advanced Algorithms

Exam 1

Assignment 1

Assignment 2

3.1   Are either $\lceil \lg n \rceil!$ or $\lceil \lg \lg n \rceil!$ polynomially bounded?

What does "polynomially bounded" mean?

How do you determine whether a function is "polynomially bounded".

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.

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

Exam 1

Part IV

Operating Systems

Exam 1