

# Computer Science Notes

*Spring 2024*

Zach Leach

Draft February 5, 2024

---

*The University of Texas at Dallas*



# Contents

<b>I</b>	<b>Computer Networks</b>	<b>3</b>
1	Exam 1	5
<b>II</b>	<b>Advanced Algorithms</b>	<b>7</b>
1	Exam 1	9
2	Assignment 1	11
3	Assignment 2	13
3.1	Problem 1 . . . . .	13
3.2	Problem 2 . . . . .	13
3.3	Problem 3 . . . . .	13
3.4	Problem 4 . . . . .	13
3.5	Problem 5 . . . . .	13
3.6	Problem 6 . . . . .	13
<b>III</b>	<b>Software Engineering</b>	<b>15</b>
1	Exam 1	17
<b>IV</b>	<b>Operating Systems</b>	<b>19</b>
1	Exam 1	21



# 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?
- 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  $\phi$  is the golden ratio  $\frac{1+\sqrt{5}}{2}$ .
- 3.3 Show that  $k \lg k = \Theta(n)$  implies  $k = \Theta\left(\frac{n}{\lg n}\right)$ .
- 3.4 Are either  $2^{n+1}$  or  $2^{2n}$  big- $O$  of  $2^n$ ?
- 3.5 For each pair of functions, indicate whether is. 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  $\Theta()$  of each other.



# **Part III**

## **Software Engineering**



# **Exam 1**



# **Part IV**

## **Operating Systems**





# **Exam 1**

