Introduction

CS 206: Discrete Structures II

Fall 2020

Staff

Instructor: Jeff Ames

TAs:

- Diana Kim
- Abraham Gale
- Sepehr Janghorbani

Grader: Ashwin Haridas

Sites

- Canvas
- Piazza

Office hours / recitations

- Ask questions
- Review
- Practice problems

Expectations

Homework

- Bi-weekly
- Work solo

Quizzes

- Weekly

Grading

- Homework: 350 points
- Quizzes: 650 points

Textbook

- Mathematics for Computer Science (LLM)
- Discrete Mathematics (Rosen or Epp)

Topics

- Combinatorics
- Probability
- Trees, graphs
- Advanced topics

Topics

- Counting
- Generating functions
- Probability spaces
- Conditional probability
- Random variables
- Deviation
- Random walks
- Recurrences
- Directed graphs
- Simple graphs
- Planar graphs

Propositions

- $x > 5$
- Rome is the capital of Italy
- 2 is the only even prime number
- 13,241,738,571,143 is a prime number

Boolean operations

- $\wedge, \vee, \neg, \rightarrow, \leftarrow, \leftrightarrow$

Examples:

- $p \vee r \leftarrow r$
- $(p \rightarrow (\neg q \rightarrow r))$
- $(p \rightarrow q) \wedge p \rightarrow q$

Truth tables

Is $p \to q$ equivalent to $\neg p \wedge q$?

Quantifiers

- Universal: $\forall$
- Existential: $\exists$

$$\forall x \exists y . x + y = 5$$

Induction

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

Set theory

- $S_1 \subseteq S_2$
- $S_1 \cup S_2$
- $S_1 \cap S_2$
- $S_1 \setminus S_2$ (or $S_1 - S_2$)
- S^C
- $\mathcal{P}(S)$

Asymptotic notation

- $f(n) = O(g(n)) : \exists c, \exists n_0, \forall n \geq n_0, 0 \leq f(n) \leq cg(n)$
- $f(n) = \Omega(g(n)) : g(n) = O(f(n))$
- $f(n) = \Theta(g(n)) : f(n) = O(g(n))$ and $g(n) = O(f(n))$

Asymptotic notation

```
count = 0;
for (i from 0 to 15):
    for (j from 1 to n):
        count++;
```