# Discrete Math, Algorithm Analysis, Programs, SWE

CSCI 335 Software Design and Analysis

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# Assessment

Homeworks: 60%

Mid: 20%

Final exam: 20%

Extra Credits:

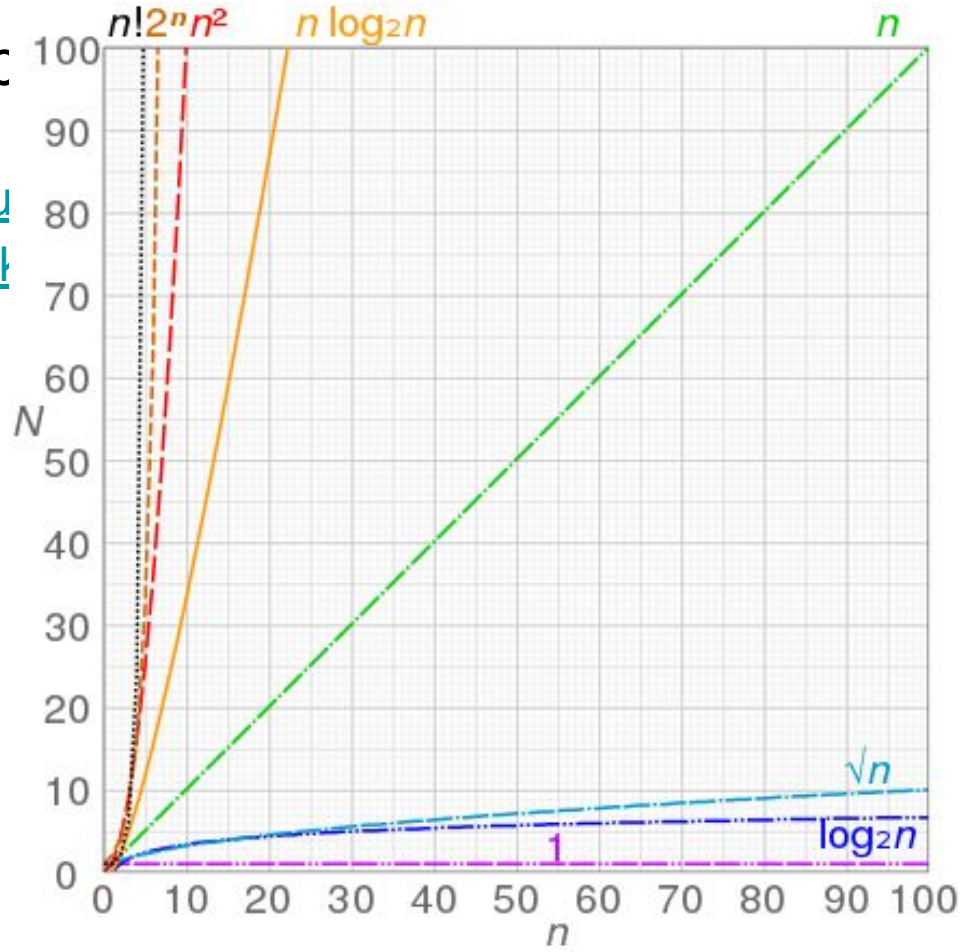
- Class participations
- LeetCode bi/weekly contest participation

# Review of some important conclusion in discrete math

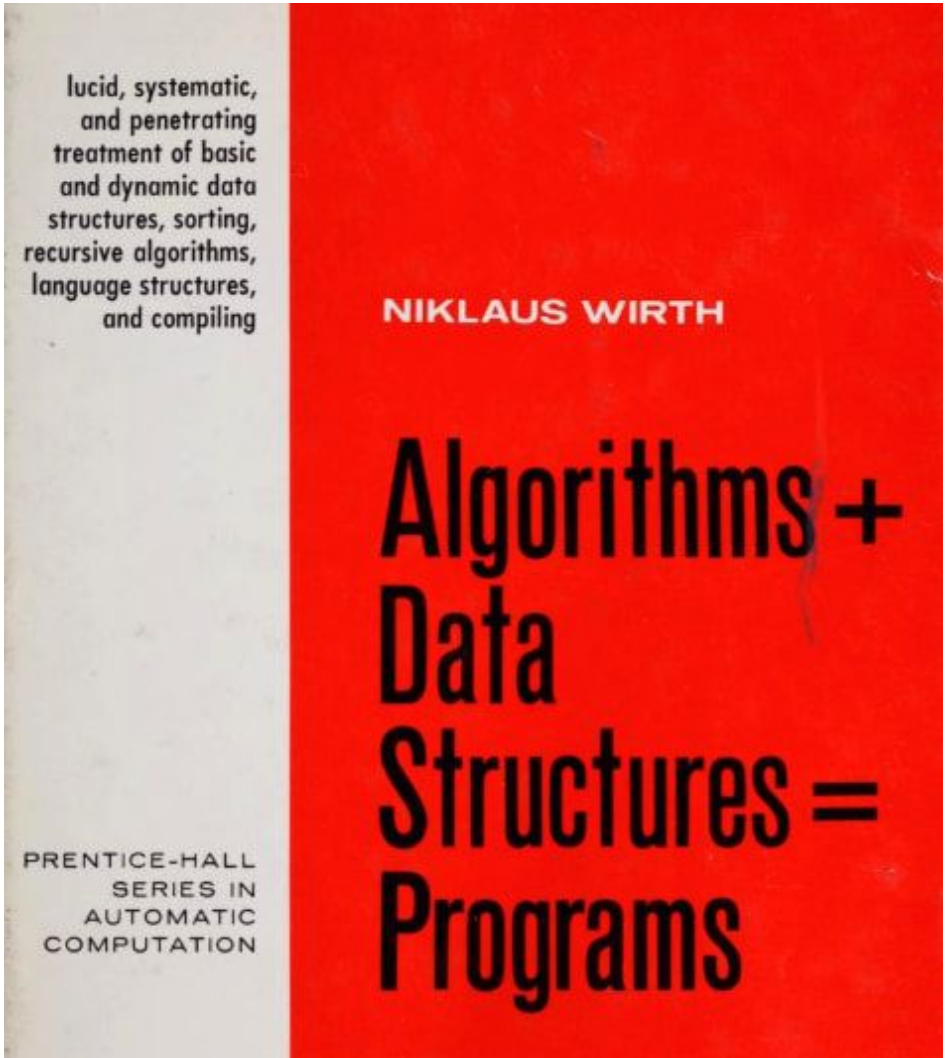
https://jimmy-shen.medium.com/three-formulas-for-algorithm-complexity-analysis-7c092ecc3db

# Time Comp

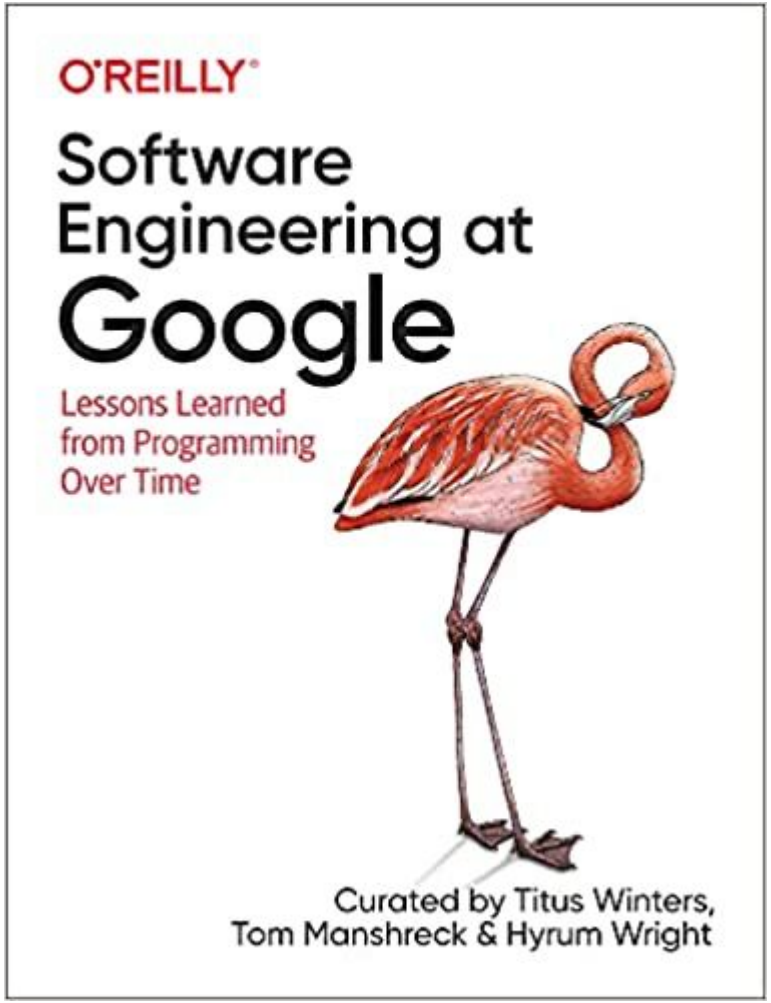
https://www.you
h?v=v4cd1O4zk



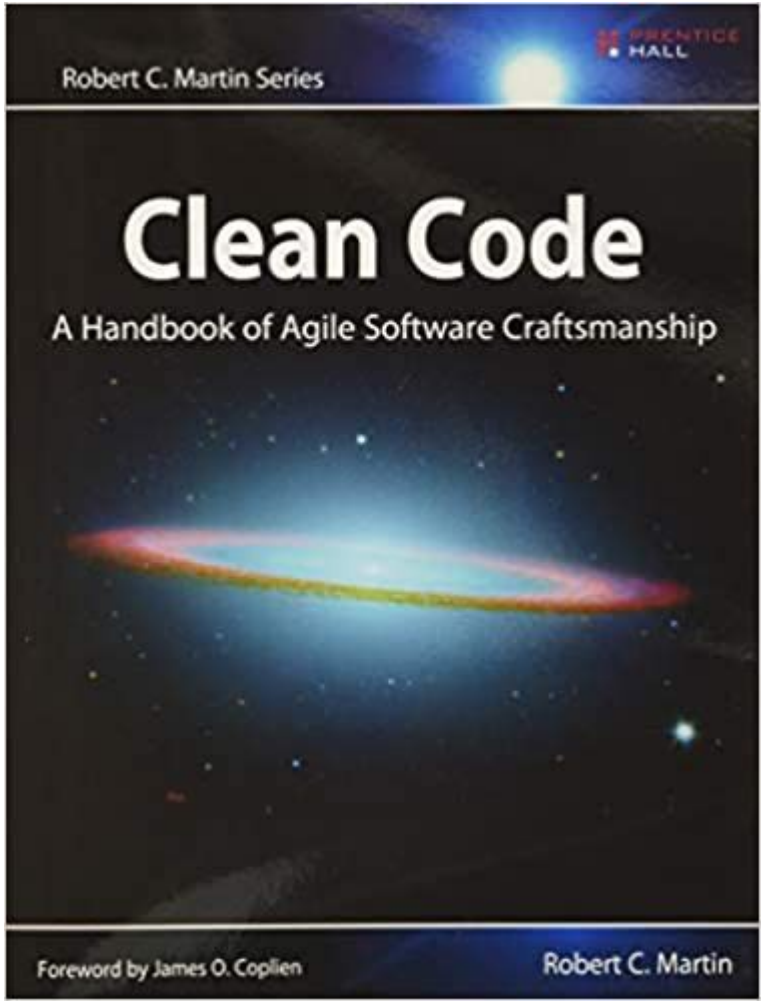
# What is program?



# What is software engineering?



# What is software engineering?



# Different stages for a SWE

Know some algorithm and data structure, however, may not know how to code them up

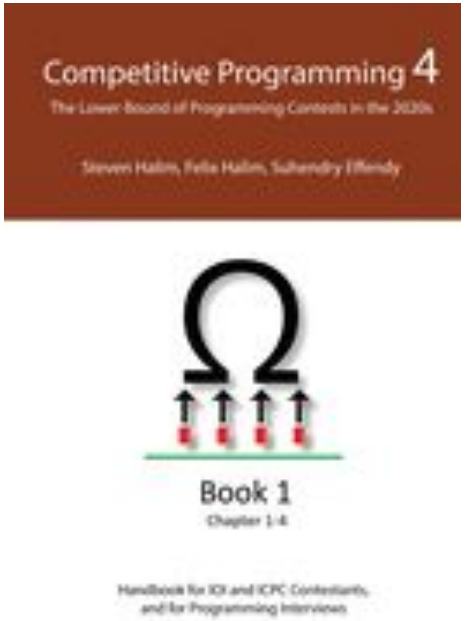
Know very well for algorithms and data structure, however, may not know how to code them up

Know very well for algorithms and data structure, also can write workable code by those algorithms and data structure

For a specified problems, can come out different solutions and be clear about the pros and cons of each one, pick up the best one to quick implement.

Can write clean code

# References




https://bookshop.org/books/competitive-programming-4-book-1-the-lower-bound-of-programming-contests-in-the-2020s/9781716745522

About $20, only book one is needed.

# Common algorithms and data structure

Data structure

STL

Union find

Trie

Trees

Graph

**Algorithms:**

Basic

- How to use stack, deque, etc
- Two pointer
- Binary number

Divide and conquer

- Sort
- Binary search
- Some recursion

Graph:

- BFS/DFS/MST/SSSP/ASSP/TSP

DP

Union find

Trie

# Software/System design

Implement hash table

min/max stack

LRU

LFU

...

What will not be covered

# Generic programming

Thanks