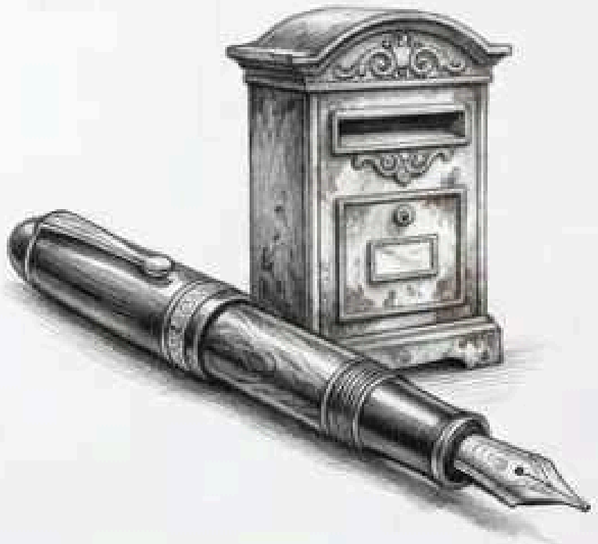
¶ 0.1

Questions or feedback are always welcome.

Email: garyanderson@mail.grokbot.com
X: @garyanderson



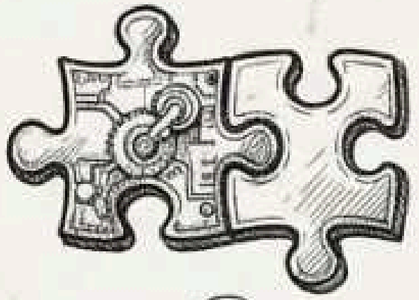
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CS 201 B (Brief)
Data Structures and Algorithms

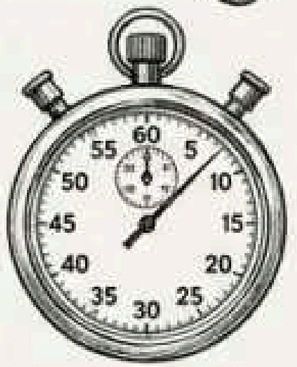
¶ 0.2

1 overview + 6 short lectures.



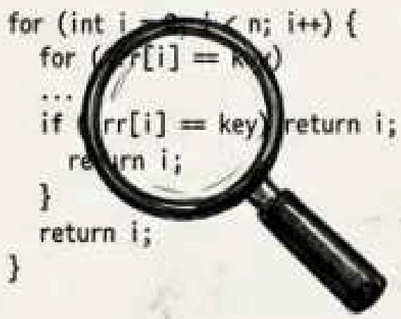


Choose a data structure.



Estimate program speed.

≈ 1 hr



Explain classic algorithms.

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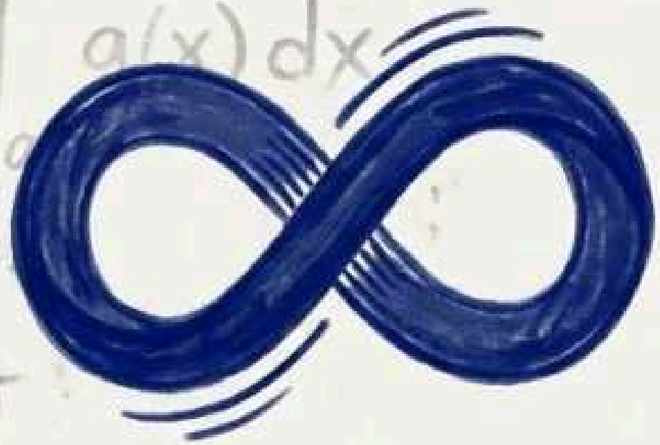
¶ 0.3



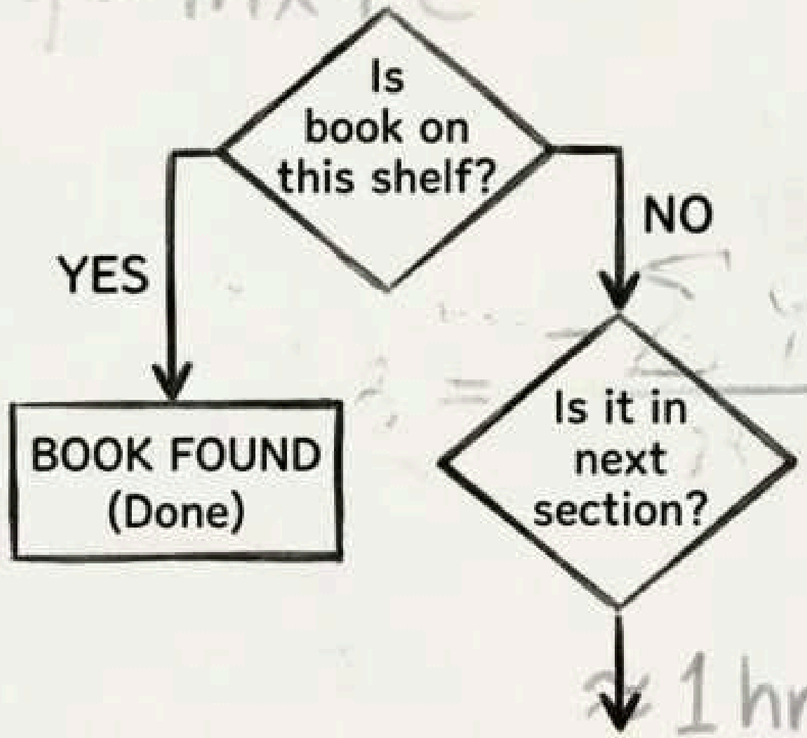
DATA STRUCTURE

The Shelving Scheme

Organizing data for efficiency.



The right structure
makes an algorithm fast.
Change the shelving,
and the best method
changes with it.



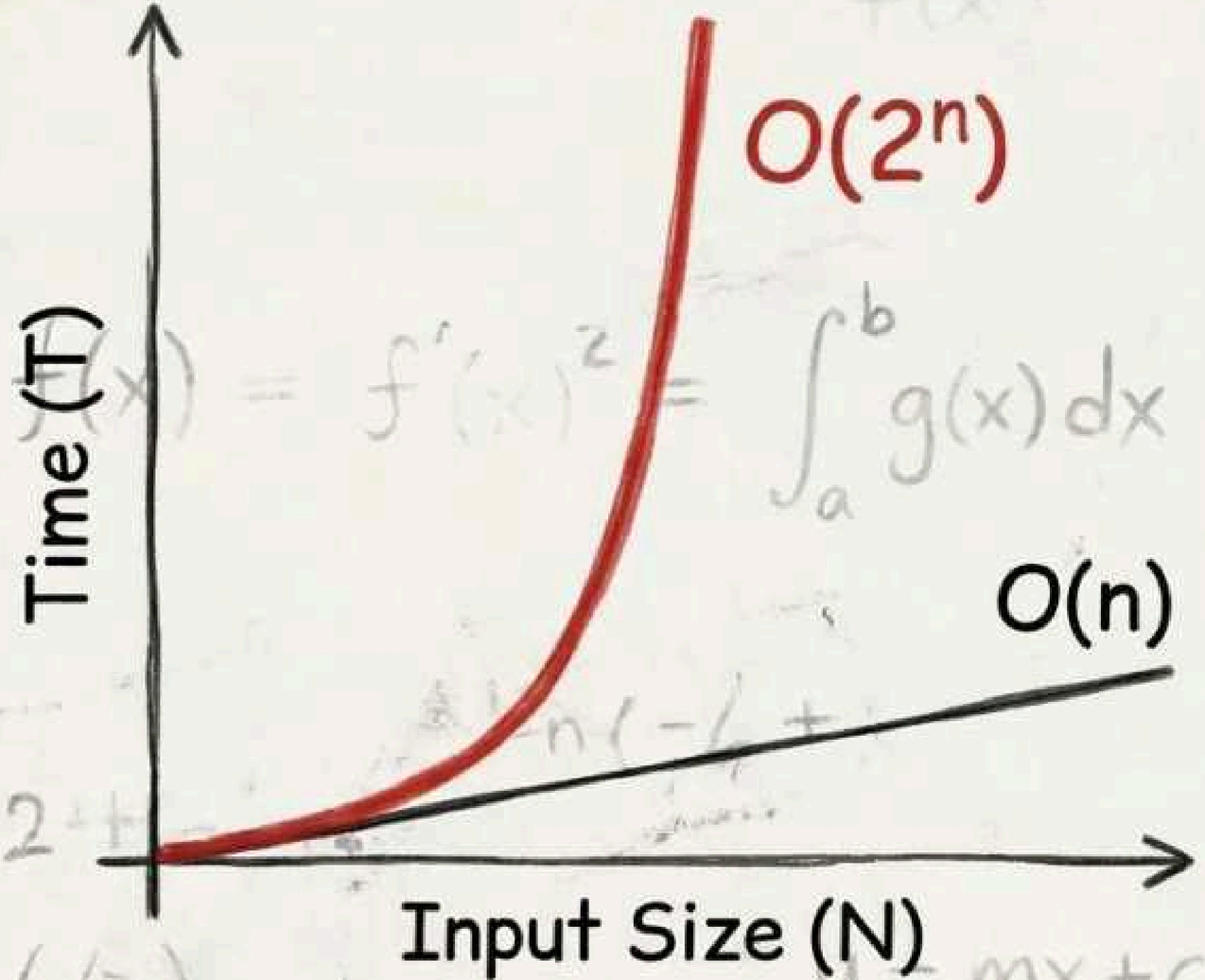
ALGORITHM

The Librarian's Method

A precise sequence of steps.

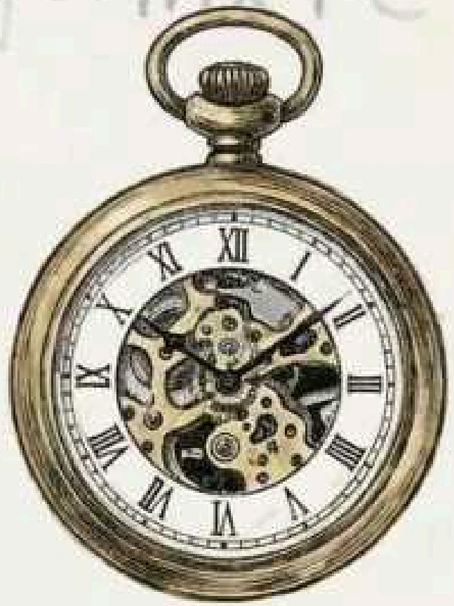
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¶ 0.4



N = 10 ⟶ 1 second

N = 10,000,000 → Hours



- Predict slow code ≈ 1 hr before running
- Choose the right tool
- Pass technical interviews

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¶ 0.5

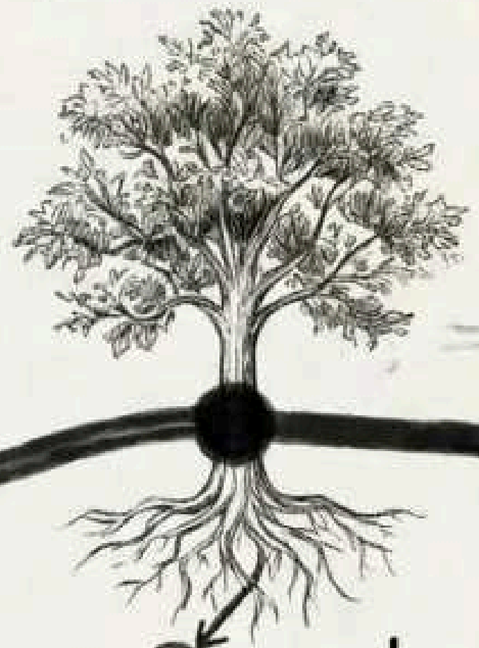
$[a_0, a_1, a_2 \ldots]$

Lecture 1:
Algorithms, Big O,
Arrays, Linked Lists.

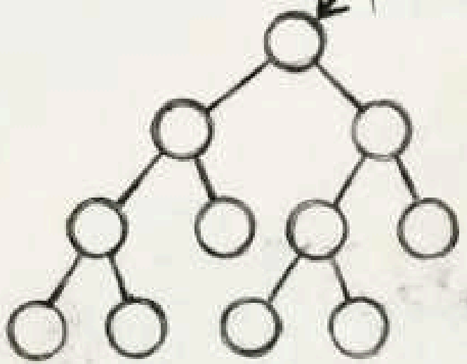
Node 1

$h(k)$

Lecture 2:
Stacks, Queues,
Hash Tables.



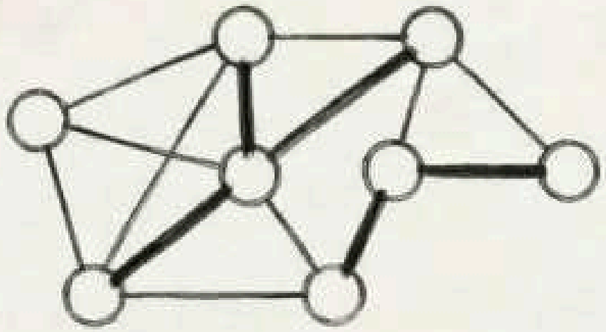
Node 2



Lecture 3:
Trees, Heaps,
Balanced Search
Trees.

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¶0.6



Lecture 4:
Graphs, shortest paths, spanning trees.

Node 4



Lecture 5:
Searching and sorting.

Node 5

$P \stackrel{?}{=} NP$

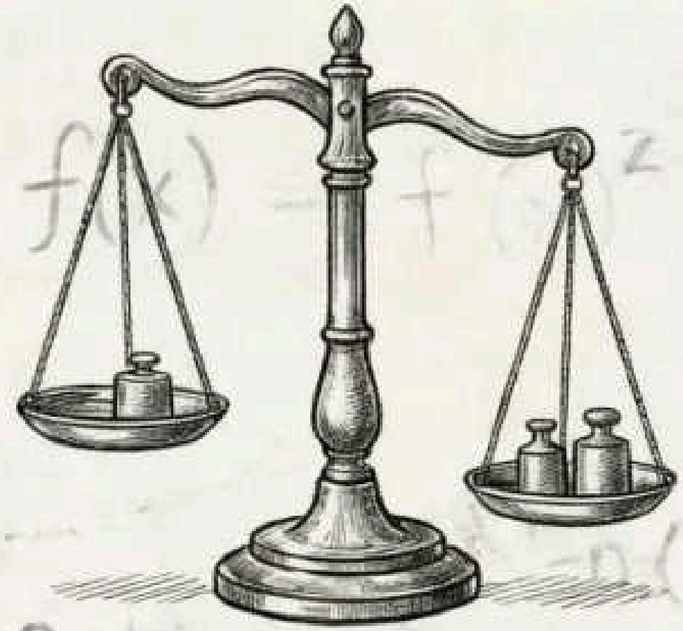
Node 6

Lecture 6:
Recursion, dynamic programming, greedy algorithms, limits of computation.

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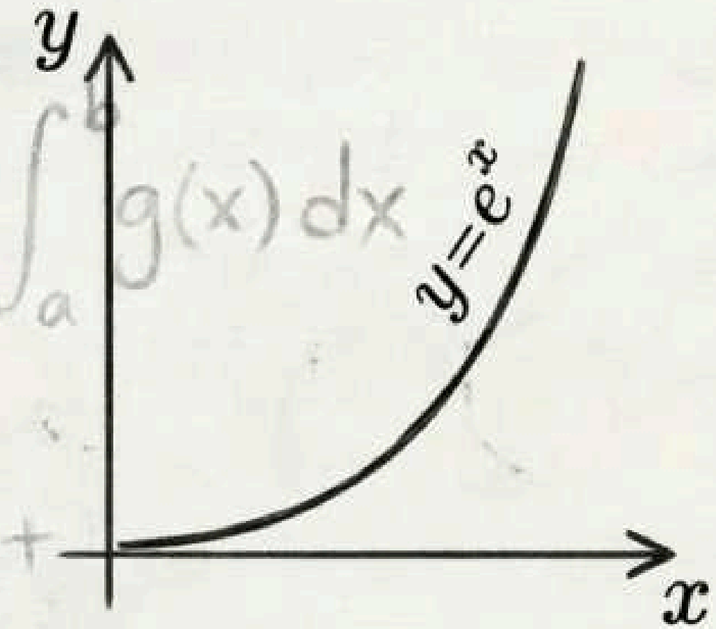
Three Big Ideas

¶ 0.7



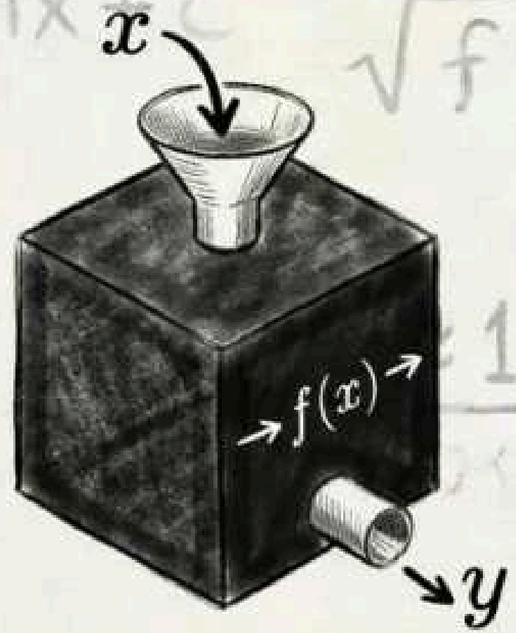
1. Trade-offs

Fast at some operations, slow at others. No single best choice.



2. Growth Rates

Curve shape matters more than raw machine speed.



3. Abstraction

Separate what a structure does from how it is built.

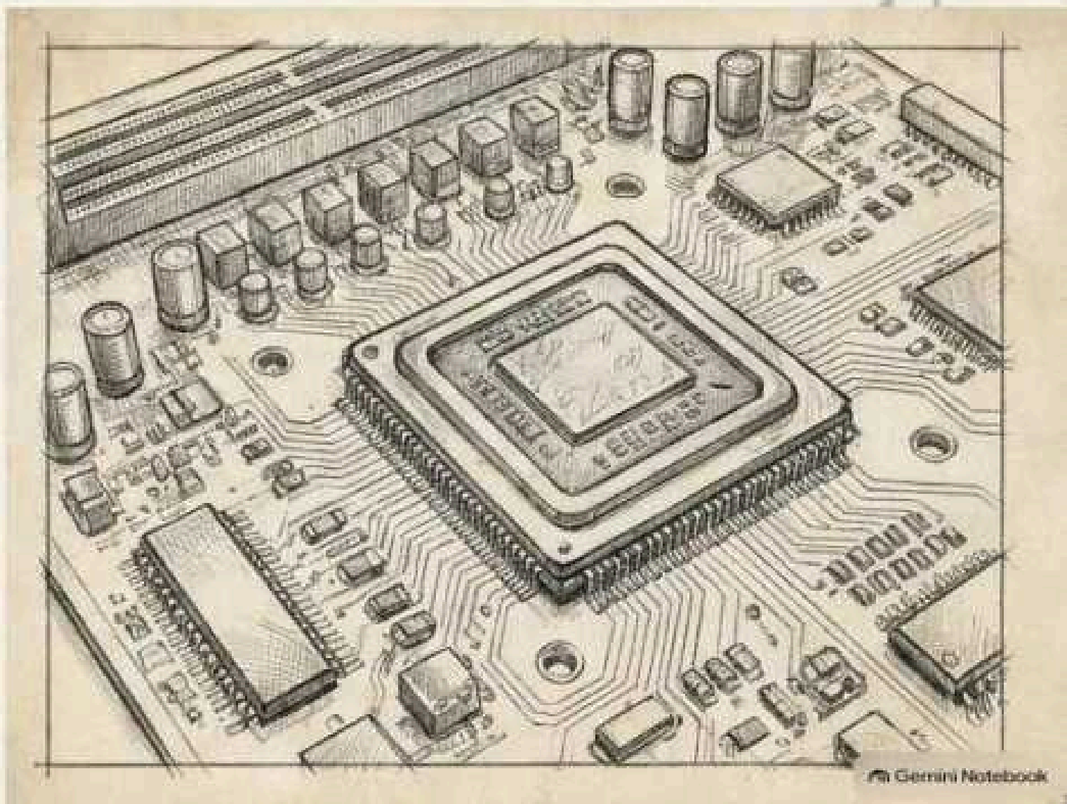
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Ground Rules

¶0.8

- Language: Plain English, language-agnostic.
- Measurement: Worst-case running times.

The Hardware Caveat:
Our simple models leave out physical effects like memory caches.



¶ 0.9

What You Need

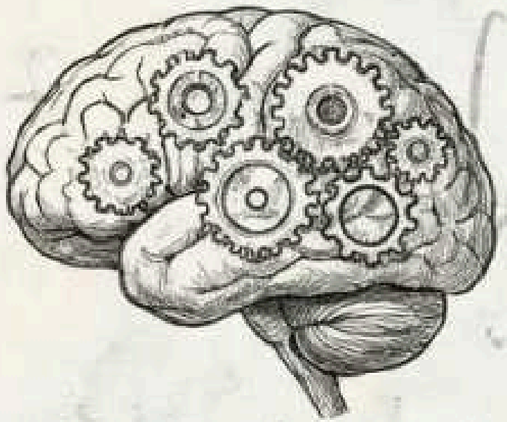
- Prerequisites:
  - **Needed:** CS 101 B level (loops, functions, lists).
  - **Not Needed:** A physical computer.

Key Advice: Writing each structure yourself (by hand) is the best way to learn.



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¶ 0.10

Pause →  → 5-Question Quiz → 50-Question Final → Tripos Paper (6 Essays)

Exercise



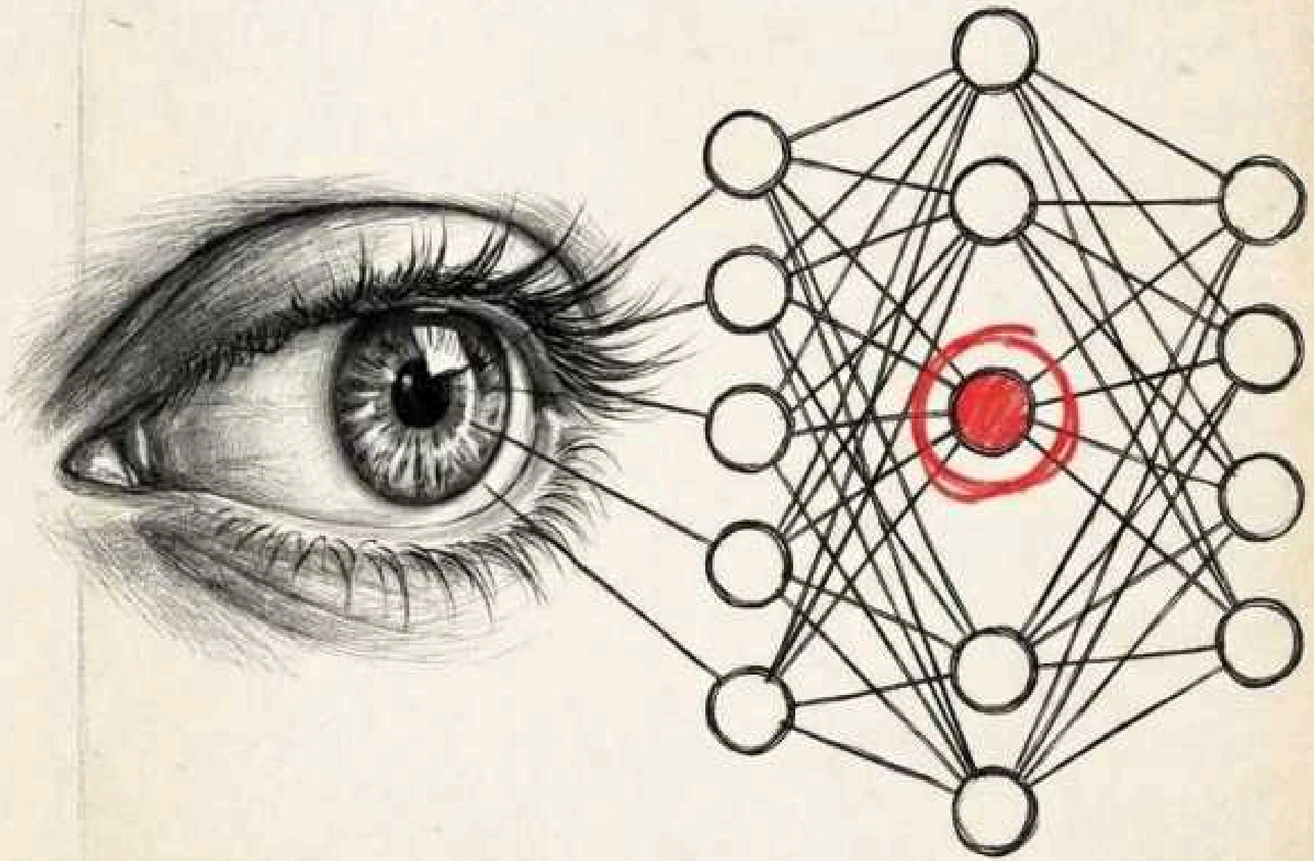
Paragraph numbers link directly to quiz answers.

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Development & Accuracy

¶ 0.11

- Developed with AI under human direction.
- Definitions, times, dates, and names checked against standard references.
- Error reporting: Use the numbered paragraphs to point to exact locations.



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¶ 0.12

Learn

Test

Check

Review
Hard Parts

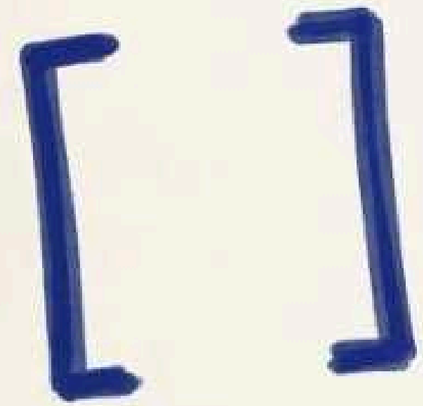


Test yourself at the end of every lecture.
Return to the hard parts until they feel easy.

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¶ 0.13

Questions? garyanderson@mail.grokbot.com | X: @garyanderson



LECTURE 1

O(n)

What is an algorithm? How do we measure one? The first two data structures.

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