Binary Search

Tried searching for happiness, but my life isn't sorted

- singlabharat, 2023

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Today’s plan:

- BS Revision
- Egg Drop Problem
- Fair Workload Problem
- Co-relating Normal BS to Advanced BS
- Ternary Search

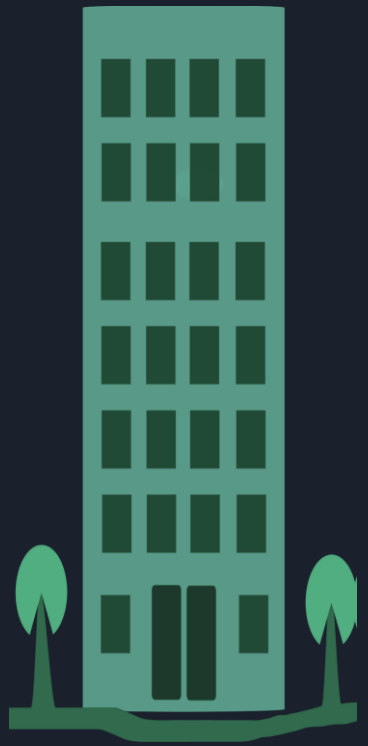
Revision!

Searching for a value in a monotonic search space by pruning half the data in each iteration

Egg Drop Problem!

- There is a 100 floors tall skyscraper
- You must determine the highest floor from which an egg can be dropped without breaking in the least tries
- If the egg breaks from a floor, it will also break from all floors higher

100 → 50 → 25 → 12 → 6 → 3 → 1



Fair Workload Problem!

- Given an array of workloads, split it among K workers, such that the maximum work that any worker has to do is minimized
- Eg: K = 3, A = [10, 5, 20, 50, 25, 45, 15] -> 75

35 75 60

$m \in [\max(A), \text{sum}(A)]$

Let max be 'm'

Eg: m = 40 ✗

m = 60 ✗

m = 100 ✓

m = 75 ✓

ANS

Some Theory...

- Predicate Function: A func that checks if the input meets some condition or not (True or False)
- Monotonic Search Space: If predicate of all elements forms pattern like FFF...TTT... or TTT...FFF... then it is monotonic and binary searchable

Ternary Search

Searching for maxima/minima of a unimodal function

- $f(m_1) < f(m_2)$

  $\Rightarrow l = m_1$

- $f(m_1) > f(m_2)$

  $\Rightarrow r = m_2$