DISCRETE MATHEMATICS

IN COMPUTER SCIENCE

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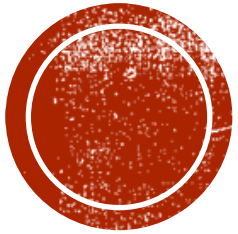
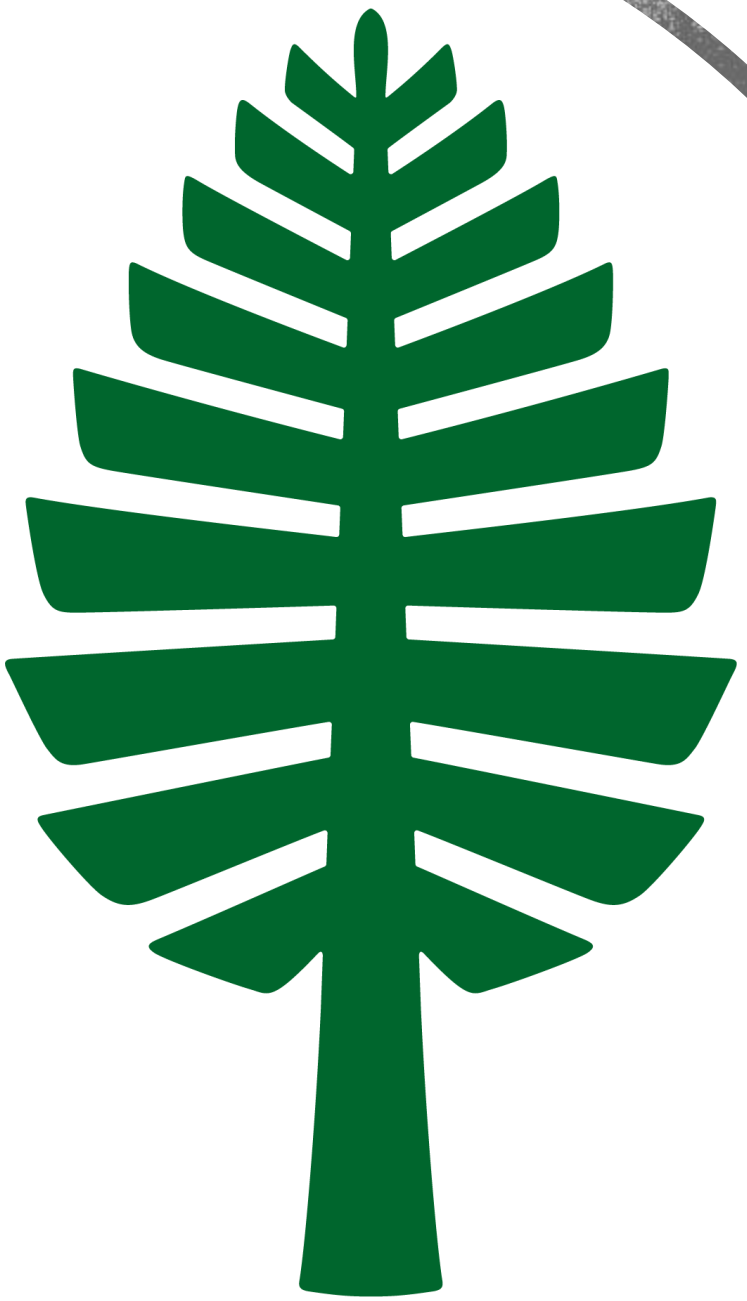
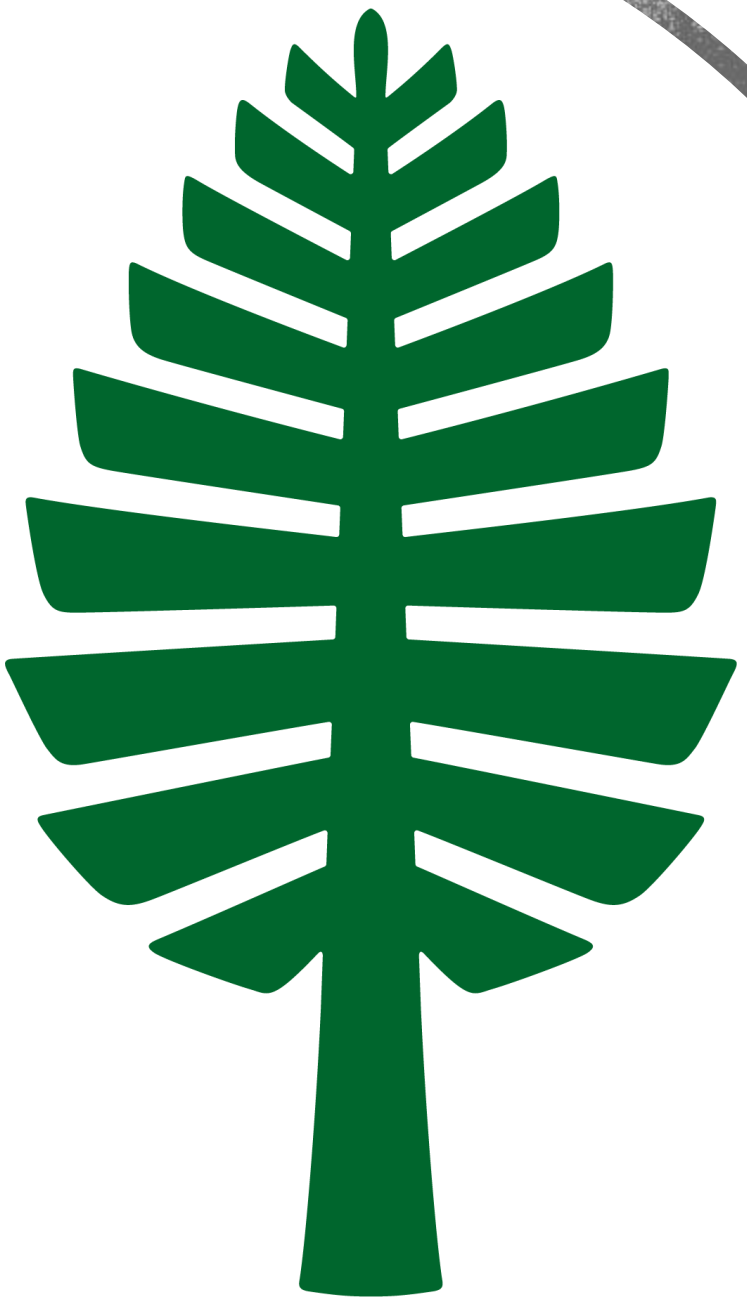


Tree Inductions



Leaf Lemma

Every tree with at least an edge has at least two leaves.



Elimination order

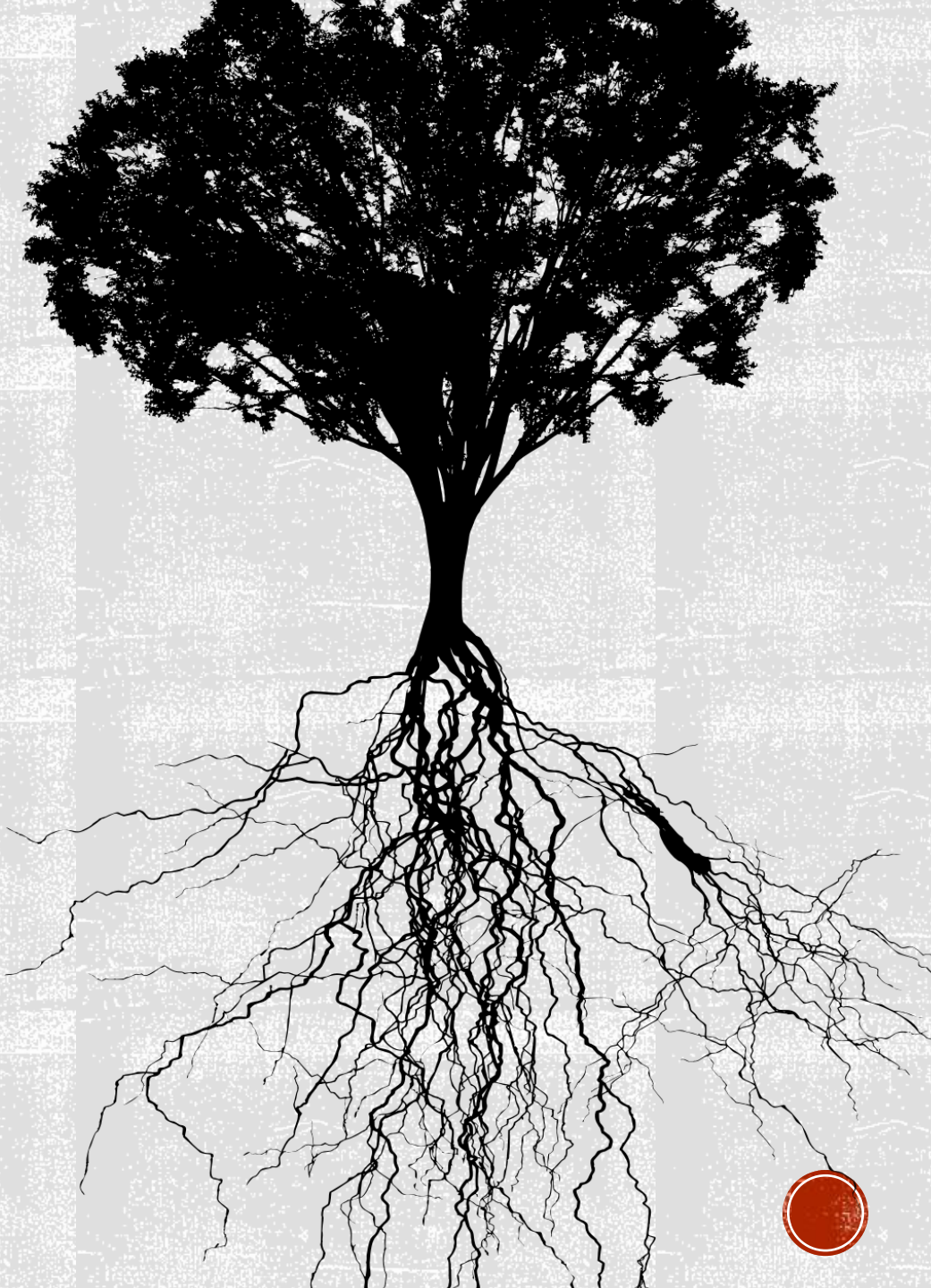
For any tree T, there is a vertex-ordering of T, such that

- vertex v_k has degree 1 in $T[v_1, \ldots, v_k]$

Alternative View

- There is a way to direct the edges of T so that every vertex has out-degree 1.

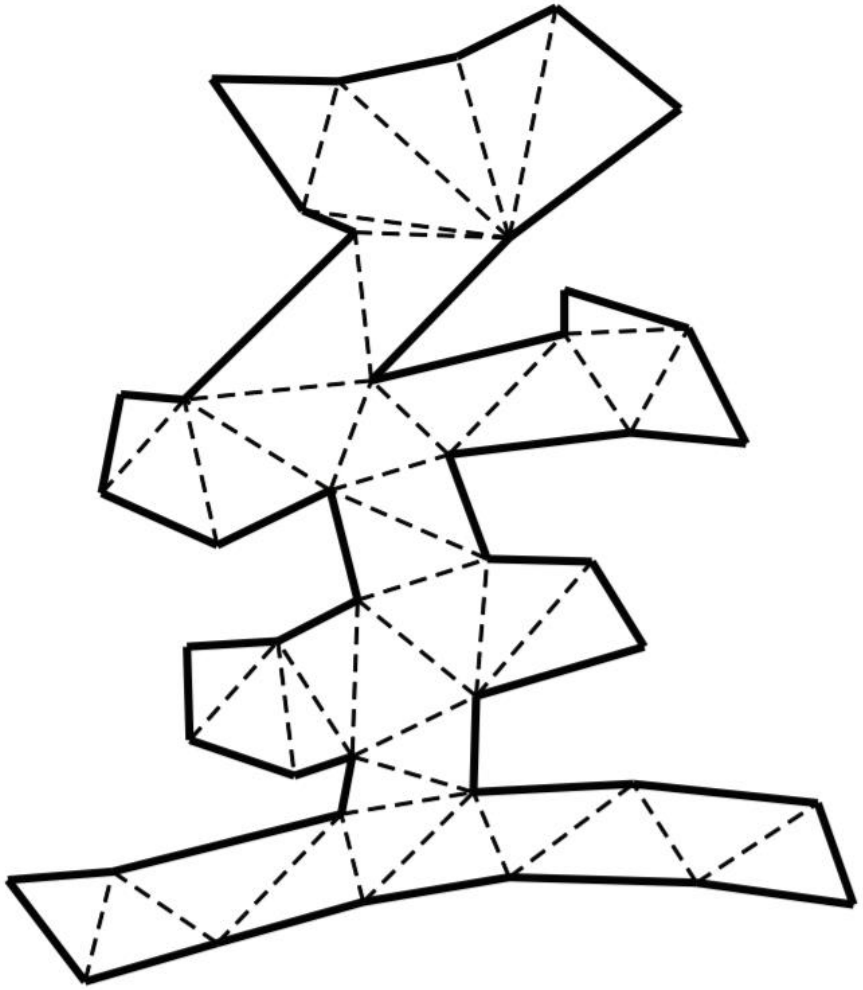
- Every tree can be rooted.



Any tree can be properly colored using at most two colors.

Corollary

Any triangulation of any polygon can be properly colored using at most 3 colors.



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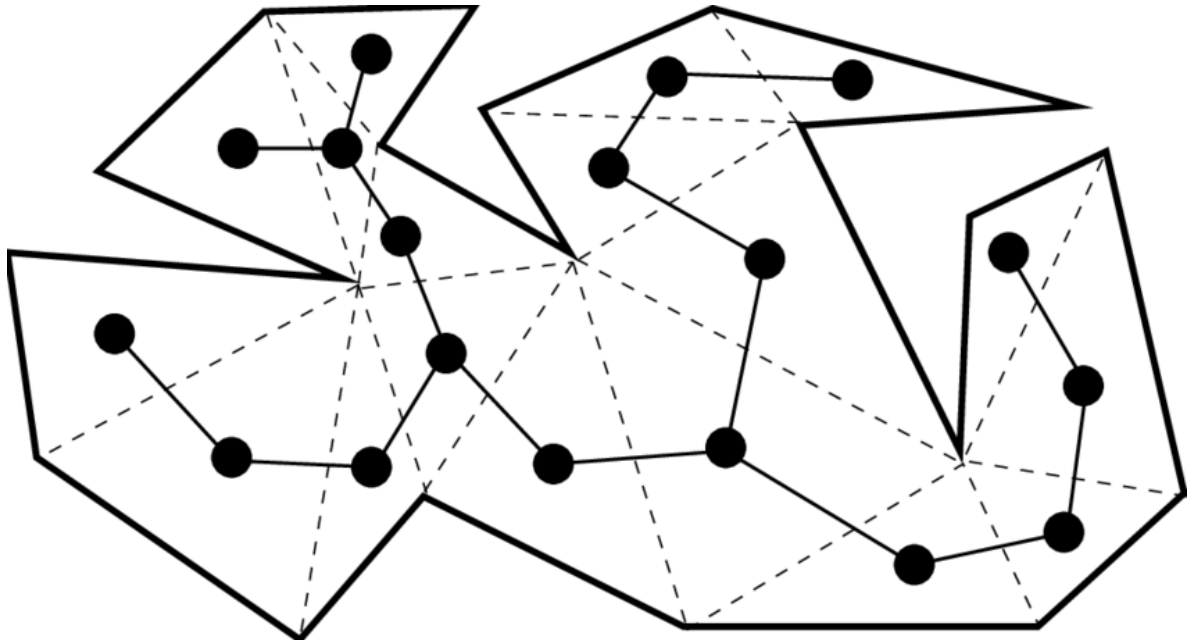
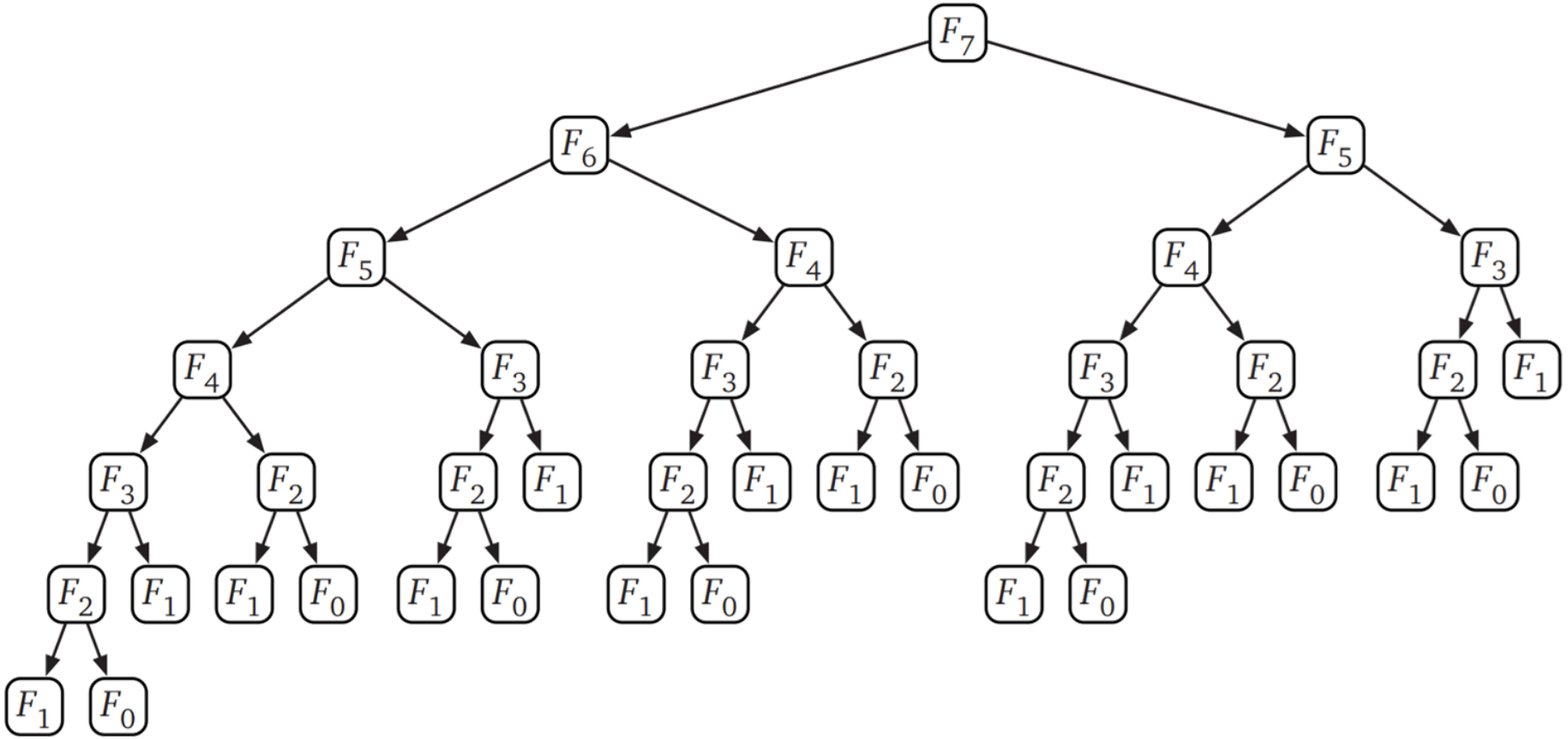
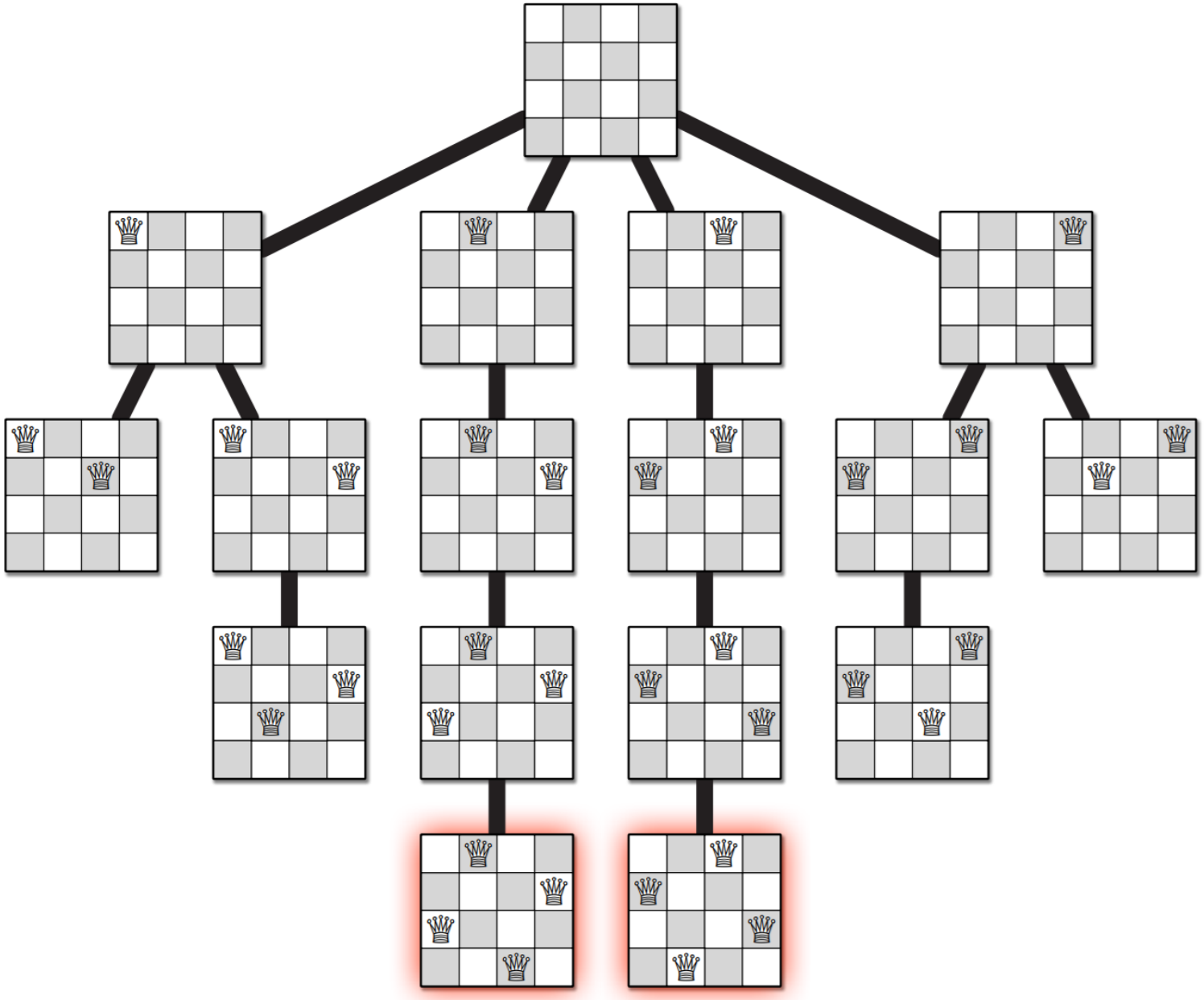


Corollary

Tree-width: How much a graph looks like a tree.



RECURSION TREE



8-Queen Problem

Given a string of 0s and 1s, how many cuts so that each segment has the form 0^k1^j?

00010111010001101

Splitting into 0s and 1s

Given a string of 0s and 1s, find the longest substring of the form 0^k1^k.

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Splitting into 0s and 1s

Given a string of 0s and 1s, find the longest subsequence of the form 0^k1^k.

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Splitting into 0s and 1s

Graph Minor Theorem: Deepest Result in Graph Theory

Next time.

Elimination order in dependency graph: Dag.