Tree Decompositions

Centroid Decomposition

See https://www.youtube.com/watch?v=3pk02p1-weU

- A tree *centroid* is a node that, when removed, maximizes the remaining two components
  - It/they must be either the **single center** or **two middle nodes**.

Can be used for divide and conquer approaches:
1) Solve problem for all paths going through some node
2) Remove node
3) Solve sub-problems recursively

Ex. problem: Yin-Yang Paths

find all balanced paths.

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__Approach:__
  - Root tree at centroid.
  - Solve recursively.
    - Store array starting at root, all elements will be accessed. But when solving sub-prob
      only at-most half will be accessed, times the number of components that the centroid s
    - Actually need two arrays, one for current recursion level that will replace the other
    - Each child-component shattered by a centroid will look at its sibiling-components, cou
      (e.g. [-1,2] ~ [-2,5] corresponds to 1 balanced path due to 2 and -2)
    - Then, update table and repeat on children-components.
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Heavy Light Decomposition