rule ball chain hamster cheese dunk donut
Removing from a BST

1) do general BST delete

and check balance further up too

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kd-Trees

Binary tree with order property

Levels 0, k, 2k, ... left subtree has lower coord \( O \)
right has greater

Levels 1, k+1, ... left subtree has lower coord 1
right subtree has greater 10

Levels 2, k+2, ...

\( x \leq 13 \Rightarrow (13, 13) \)
\( y \geq 14 \Rightarrow (14, 14) \)
\( x \leq 14 \Rightarrow (14, 14) \)
\( y \geq 14 \Rightarrow (14, 14) \)

add

remove

Build balanced

preprocessing sort by \( x \)
sort by \( y \)

choose median \( x \) coordinate

split \( L_x \) into 1st half / 2nd half
split \( L_y \) into left \( (by \ y) \) / right \( (by \ y) \)

recursively build left / right subtrees

\( O(n \log n) \) overall