Adding a BST

```
add (HUN)
```

Result:

1) create new node
2) link parent to new node
3) link new node back to parent
Rotations

deeply unbalanced

height difference

no good!

R still unbalanced

balanced

and no change in height
Removing from a BST

### Easy Cases

- **Node to delete**: deleting leaf
  - incoming = NULL

### Harder case

- 4 sets of pts to change:
  1. parent of deleted to replacement
  2. parent of replacement to right child of replacement
  3/4 left/right children of deleted as left/right children of replacement

  (Think about special cases of this)
Range

\[ O(\log n) \quad \overrightarrow{p} \quad O(\log n) \]

\[ O(\log n + p) \]

2d-tree \( O(\sqrt{n} + p) \)

range 3-12

\[ (-\infty, \infty) \]

\[ (-\infty, 7) \]

\[ (13, \infty) \]