Announcements

• Project 3 is due Thursday 10/23 @ 11:59pm
  § Please submit two ways: the normal way and using python3 ok --submit!
  § You can view your ok submission on the ok website: http://ok.cs61a.org
• Midterm 2 is on Thursday 3/19 7pm-9pm
  § Review session on Tuesday 3/17 5pm-6:30pm in 2050 VLSB
  § HKN review session on Sunday 3/15 12-3pm in 10 Evans
  § Conflict form submissions are due Friday 3/13!
  § 1 2-sided sheet of hand-written notes created by you + 2 official study guides
  § Same exam location as midterm 1. See http://cs61a.org/exams/midterm2.html
• Today’s lecture contains the last of the Midterm 2 material (Monday is just examples)
• No lecture next Wednesday 3/18
• No discussion sections next Thursday 3/19 or Friday 3/20
• Lecture next Friday 3/20 is a video (but a great one)

Sets

One more built-in Python container type

• Set literals are enclosed in braces
• Duplicate elements are removed on construction
• Sets are unordered, just like dictionary entries

```python
>>> s = {3, 2, 1, 4, 4}
>>> s
{1, 2, 3, 4}
>>> 3 in s
True
>>> len(s)
4
>>> s.union({1, 5})
{1, 2, 3, 4, 5}
>>> s.intersection({6, 5, 4, 3})
{3, 4}
```
Sets as Ordered Sequences

Proposal 2: A set is represented by a linked list with unique elements that is ordered from least to greatest.

Use sets to contain values

Nothing

Implement set operations

Ordered linked lists

Order of growth? $\Theta(n)$

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Sets as Binary Search Trees

Proposal 3: A set is represented as a Tree with two branches. Each entry is:

- Larger than all entries in its left branch and
- Smaller than all entries in its right branch

A binary tree is a tree that has a left branch and a right branch.

Order of growth? $\Theta(\log n)$

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Membership in Binary Search Trees

set_contains traverses the tree

- If the element is not the entry, it can only be in either the left or right branch.

Order of growth? $\Theta(\log n)$

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Adjoining to a Tree Set

Order of growth? $\Theta(\log n)$

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