Announcements

- H1N1: If you have a fever, stay home
- FIRST callout
  Sep 1 until 8:00pm, MSEE atrium
- Study Abroad callout
  Sep 2 at 7:00pm, LWSN 3102AB
- Google Code Jam
  Sep 3 is registration deadline
  `http://code.google.com/codejam/`
- State Farm programming competition
  Oct 3 from 1:00 pm to 7:00 pm, online
  `http://www.sfresearchcenter.com/codingcomp/`

TIPs and BUGs

- BUGs
  - While loop with incorrect test (< vs <=)
  - Leading blanks on input
  - Overusing sets
  - Match output case correctly
- TIPs
  - Program defensively
    - Test 0, 1, infinity
    - Use robust input (e.g., nextInt() in Java)
  - Use UVa for debugging; PC for submission
  - C++ data structures: http://www.sgi.com/tech/stl
  - Java data structures: java.util package
  - C++: memset in string.h

Overview

- Algorithms + Data Structures = Programs
  Niklaus Wirth, inventor of Pascal
  also Program Development by Stepwise Refinement
  `http://sunnyday.mit.edu/16.355/wirth-refinement.html`
- Variables of simple types
  int, float, char, boolean, string, …
- Aggregates: arrays, structs/classes
- Dynamic data structures: stacks, queues, dictionaries, sets, …

Chapter 2: Data Structures (1)

- Stacks. Useful for…
  - arbitrary-sized item storage when order doesn't matter
  - handling nested data (e.g., parenthesized expressions)
  - an alternative to recursion
- Queues. Useful when…
  - order matters (first-in, first-out)
  - need a deck of cards

Chapter 2: Data Structures (2)

- Dictionaries
  - An arrays “maps” an int to an object
  - Dictionaries are generalized arrays
  - Map arbitrary value to arbitrary value
- Priority queues
  - Queues with an ordered key
  - Useful for timed event simulation, computational geometry
  - Good implementation: binary heap
  - Under pressure: sorted array

Chapter 2: Data Structures (3)

- Sets
  - Easy: Use dictionary
  - Fast: Use bit vector

C++ Libraries

```
#include <stl.h>
…
stack<int> S;
stack<char> T;
```

- Stack, Queue, Dictionary, Priority Queue, Set
- Tutorial: http://www.sgi.com/tech/stl/

Java java.util Package

- Stack: Stack<E>
- Queue
  List, ArrayList, LinkedList
- Dictionary
  Map, HashMap, Hashtable
- Priority Queue: PriorityQueue<E>
  SortedMap, TreeMap
- Set
  HashSet

Problems Today

- Try using different data structures
- Jolly Jumper
- Hartals
- Contest Scoreboard