Mon 1/30 Sorting

Order
- Lexicographical (alphabetical)
- Total and partial ordering, we only use total

Why sort
- Adds info about our data, before after greater etc
- Merge, search, duplicate, median

Bogo sort
- Enumerate all orderings
- Pick the one in order

Selection sort
- Smallest at first spot
- Compare nums and swap
- n^2

Insertion sort
- Add elements and then sort the array as things are added

Binary search
- Check for where to insert using the middle and < > , then move things down, then place the element

Bubble sort
- Look at elements by twos and swap to be less than and then greater than

Merge sort
- Nlogn
- Cut array in half
- Run = Pull one from each and sort those into a third array that are in order in those pairs of two
- Do it again and again
- Runs double until it is sorted

efficiency
- O(n^2)
    - Bubble, insertion, selection, quick (worst case)
- O(n^(5/3))
    - XXX
- O(nlogn)
    - heap

Shell sort
- Sort from edges out

Quick sort
- Array small → use shell sort
- Pivot, left, middle, right
- Quick sort the left and right (recursive calls)

Heap sort
- Lots of types of heaps
- Heap = single node in a binary tree

- There are parent and children nodes, parent is greater, children are parents
- Index heap is 10, left child 20 right child 21
- Always pick larger child to move up
- Making the heap: nlogn

Radix sort

- Look up video on algorithm complexity

Wed 2/1 computational complexity

O = “on the order of”
Look at loops and recursion
One loop order n, nested double n^2, nested triple n^3
One outer two inner loops order n log n ??? quick sort ex
Add loops at same level
Mult loops within each other
Constant c

- Think of it as the overhead
- Can have several compenents, can be time, can be steps

Recursion
Counting time (steps), space (memory)

Bit vectors
Logical shift - left and right zeroes shifted in
Arithmetic shift - left zero shifted in (same as mult by 2), right is like div by 2 (msb/leftmost bit is the sign bit so it shifts in what that original sign bit was)
Bitwise operation symbols
Use or to set stuff