CS180 - Sorting a list

Announcements

- Program due tomorrow
- New HW posted, due next Wed.

head

_back

tail

it

list.end()
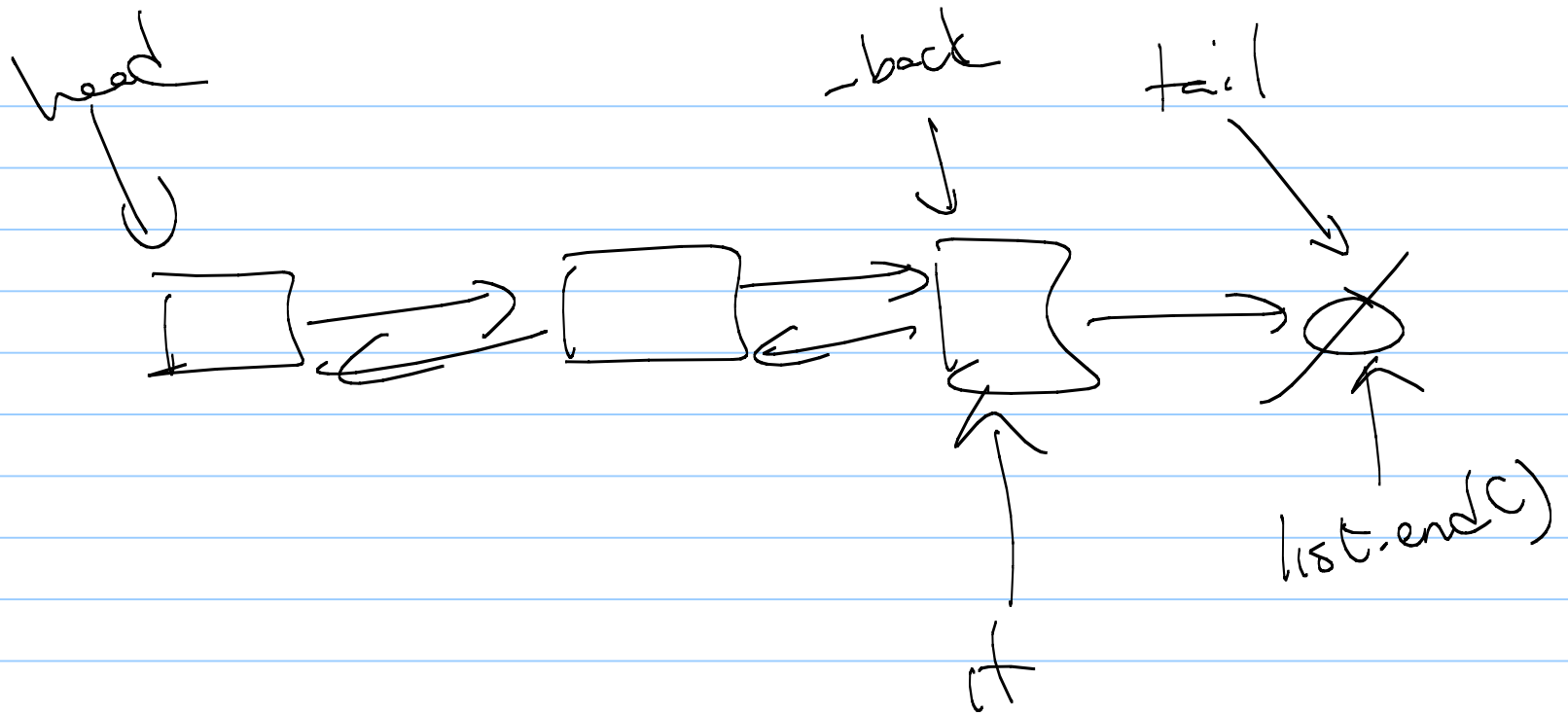
How do we sort a list?

5   2   10   -1   7
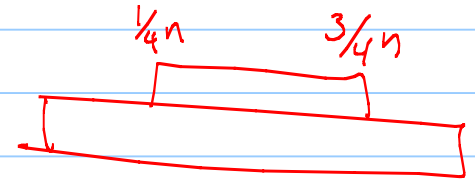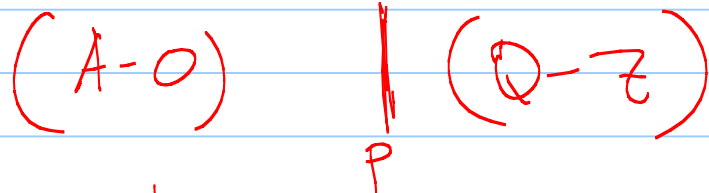
divide & conquer: quicksort

Sorting algorithm #1: Quicksort

Take first card

Worst case: $O(n^2)$
Randomized : $O(n \log n)$

$(A-O) \quad | \quad (Q-Z)$
P

Everything less goes into left pile
Everything bigger goes into right pile

Base case: size of my pile is 0 or 1

Sorting Algorithm #2 : Bubble Sort

$$\sum_{i=1}^{n} i \longrightarrow O(n^2)$$

2 6 5 3 11 -2 4

2 5 6 3 11 -2 4

2 5 6 3 11 -2 4

2 5 3 6 11 -2

-2 11 4

2 5 3 6 -2 4 11

Sorting Algorithm #3

4   2   1   3   5   0   6

2   4

1   2   4

1   2   3   4

for i ← 0 to n-1
  index ← 0
  insert {
    while A[i] > A[index]
      index ++;
    Swap(A[i], A[index])
  }

$O(n^2)$ or $O(n \log n)$

Sorting Algorithm #4   Selection Sort

$O(n^2)$

1   3   5   2   4   6

~~index~~

index

i

1   2   5   3   4   6

index   i

Sorting Algorithm #5 | Merge Sort

$$O(n \log_2 n)$$

| 2 | 4 | 3 | 8 | 9 | -1 | 11 | 10 |

2 ~~4~~ ~~3~~ 8   ~~-1~~ 9 ~~10~~ 11

~~2~~ ~~3~~ 4 ~~8~~   ~~-1~~ 9 10 11

-1 2 3 4 8 9 10 11

Another way: Bucket Sort

Comparing them