① I will announce TAs by tomorrow afternoon

② Assign #5 – print / I don't care if you take length or not.

remove / supposed remove nodes that have a specific value.

③ not demoing we grade on our own.

CS 162
Intro to CS II

Linked Lists, Sorting, and Big O

Chap. 17

[redacted]

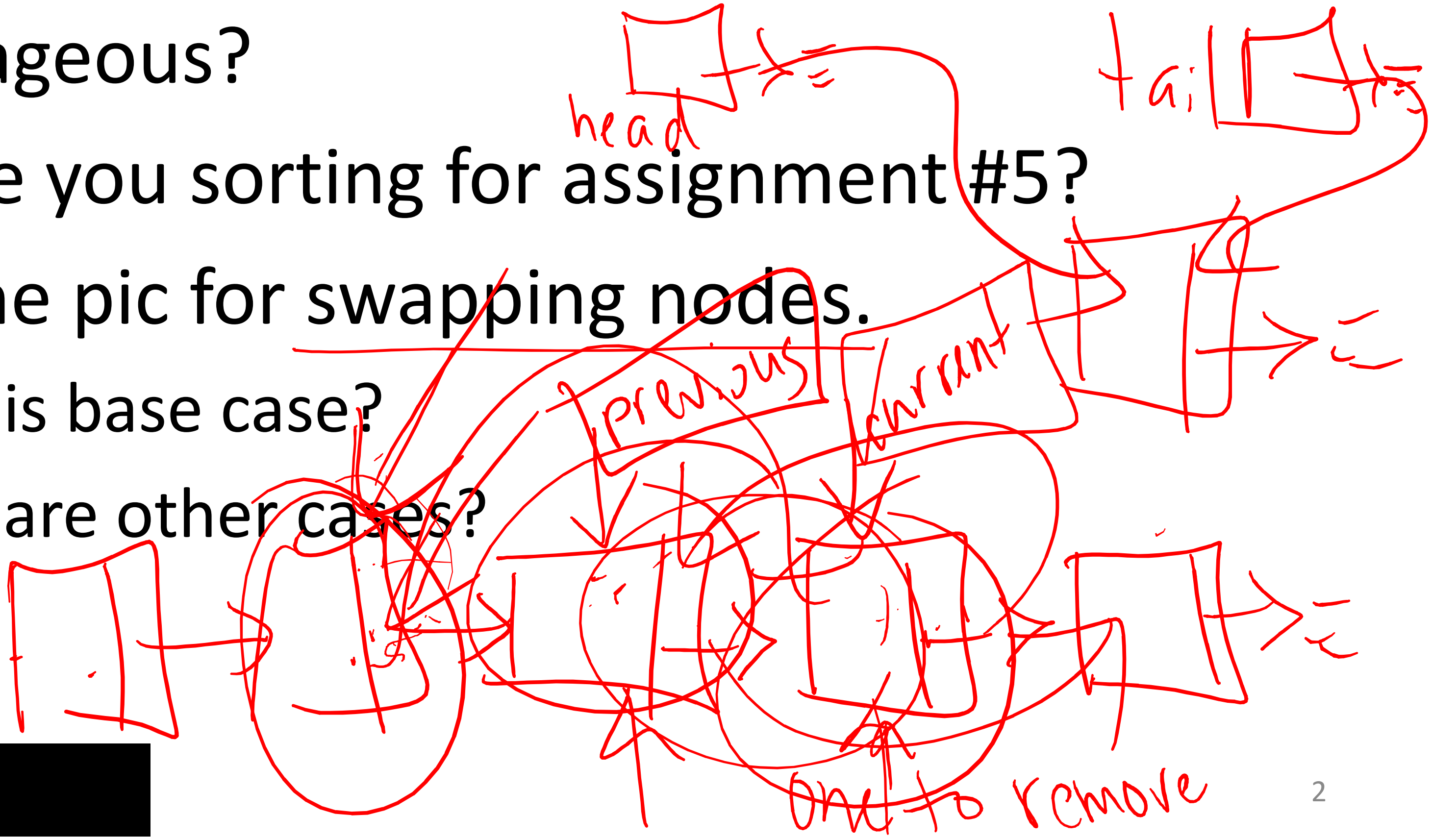
if head + tail are null head
~~tail=head=push(or append(tail)~~

In-class exercise…

else
head.push(head) → O(1)
tail=append(tail)

~~Extra credit~~

- Get into groups of 4-5.
- Why is having a tail in a linked list advantageous? append
- How are you sorting for assignment #5?
- Draw the pic for swapping nodes.
  - What is base case?
  - What are other cases?



temp=val1
val1=val2
val2=temp

[redacted]

Complexity – Big O

- Based on what?

Data + Algorithm

- Why is this important?

scalability

[redacted]

~~n~~

Constant time – O(1)

```
struct node * push(struct node *head, int n) {
  struct node *temp=malloc(sizeof(struct node));
  temp->val=n;
  temp->next=head;
  head=temp;
  return head;
}
```

Have anything to do w/ the size of list?

[redacted]

Linear time – O(n)

```
int length(struct node *head) {
  int n=0;
  while(head!=NULL) {
    n++;
    head=head->next;
  }
  return n;
}
```

n+=2

n?

O(n^n)

[redacted]

Quadratic time – O(n^2)

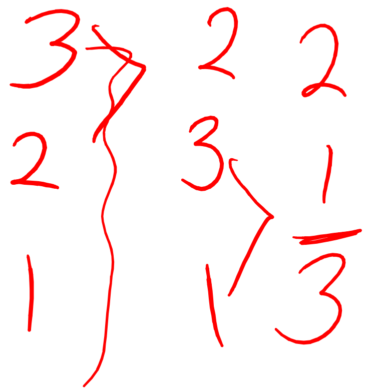
```
void bubble_sort(struct node *head, int size) {
  …
  for(int iteration=1; iteration<size; iteration++) {
    for(int i=0; i<size-iteration; i++) {
      if(current->val > current->next->val){
        //swap values
      }
      //move current to next node
    }
    current=head;
  }
}
```

n

n

for i n

n



[redacted]

Logarithm (base 2) time – $O(\log_2 n)$

```
int binarySearch(const int list[], int length, int item) {
  int first = 0, last = length – 1, mid;
  bool found = false;
  while (first <= last && !found)
  {
    mid = (first + last) / 2;
    if (list[mid] == item)
      found = true;
    else if (list[mid] > item)
      last = mid - 1;
    else
      first = mid + 1;
  }
  if (found)  { return mid; }
  else   { return -1; }
} //end binarySearch
```

$n = 1024 = 2^{\boxed{10}}$

10

[redacted]

Final Project…

- Understanding Merge Sort…

nlogn

- It will be posted today…
- Absolutely no late finals accepted!!!

[redacted]

Sorting Algorithms…

- https://www.youtube.com/watch?v=kPRA0W1kECg
- Search for Sorting Dancers

[redacted]