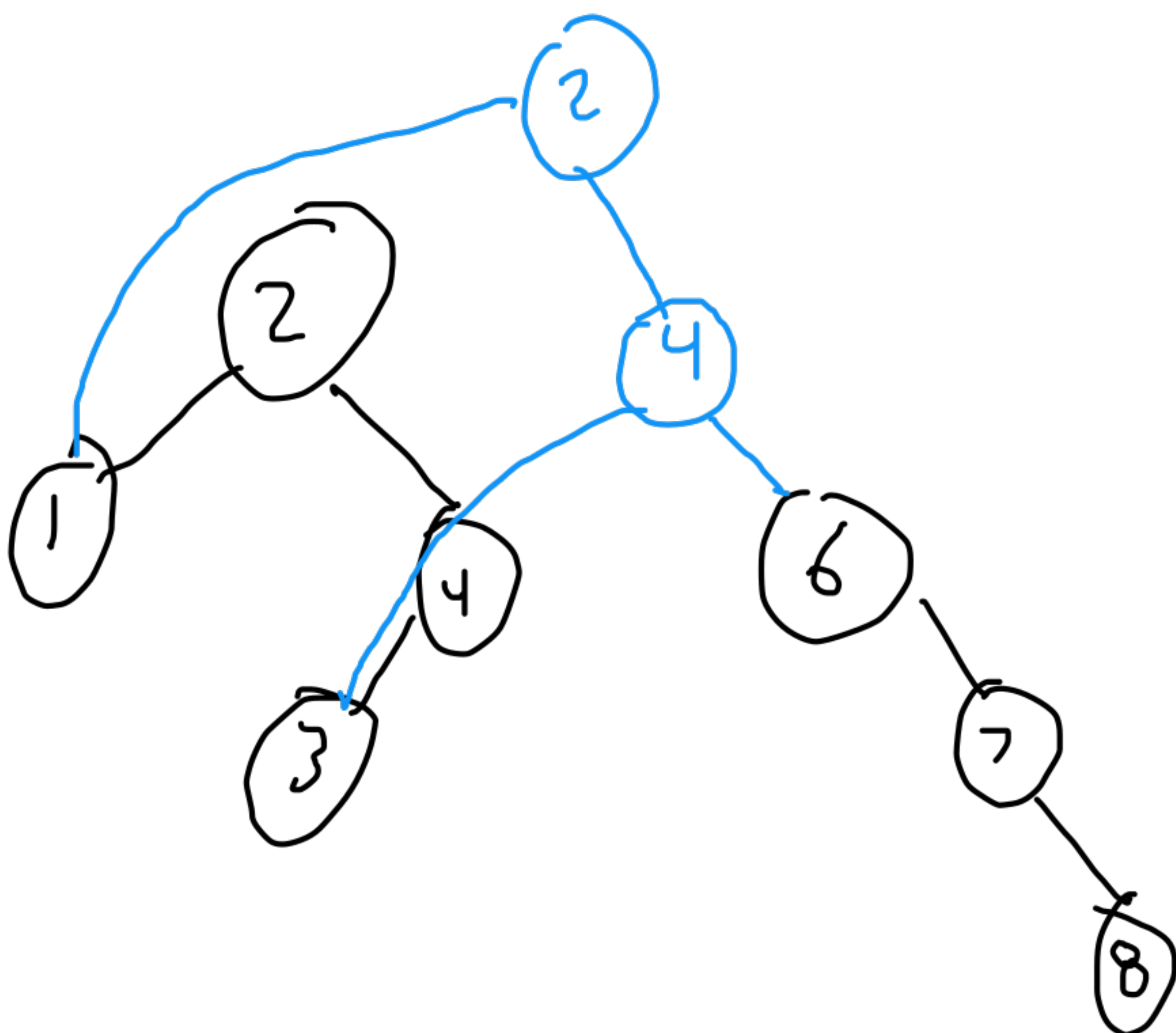
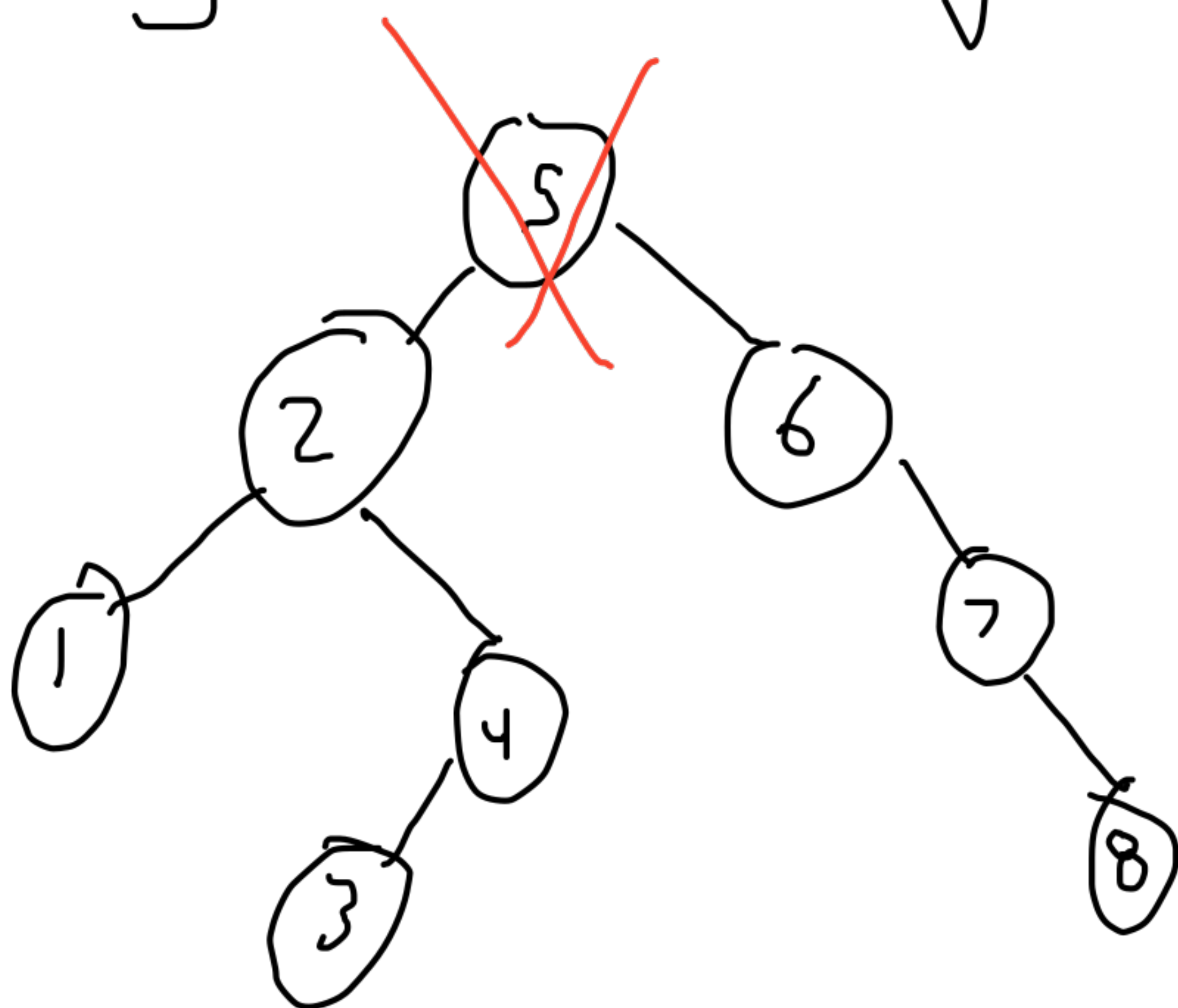


# Deleting with Merge



# Mergesort

9, 5, 4, 2, 3, 7, 6, 1

9, 5, 4, 2

3, 7, 6, 1

9, 5

4, 2

3, 7

6, 1

9, 5, 4, 2, 3, 7, 6, 1

5, 9, 2, 4, 3, 7, 1, 6

2, 4, 5, 9

1, 3, 6, 7

1, 2, 3, 4, 5, 6, 7, 9

$$m = s + \frac{(e-s)}{2}$$

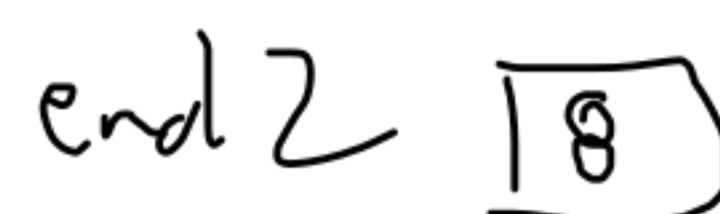
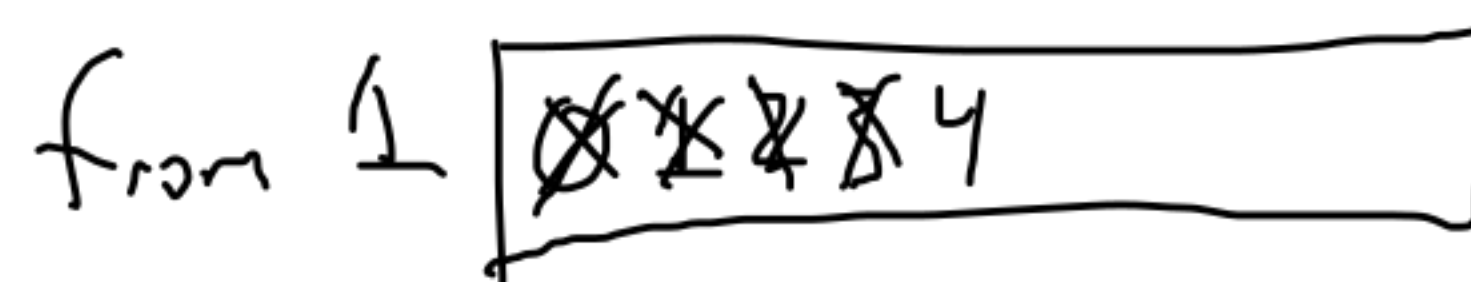
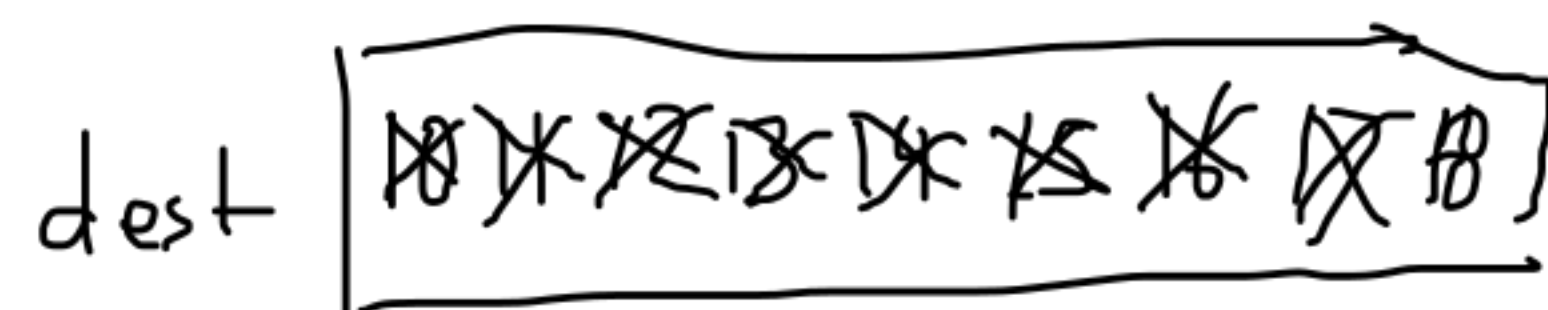
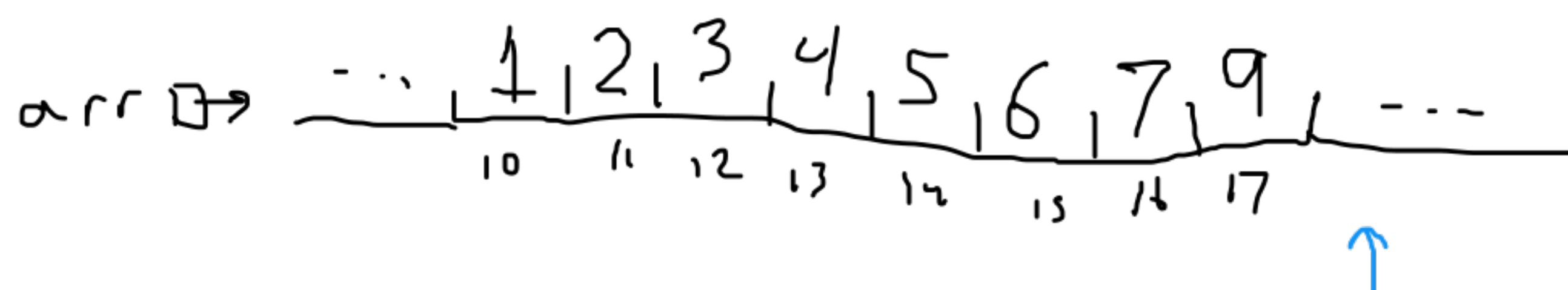
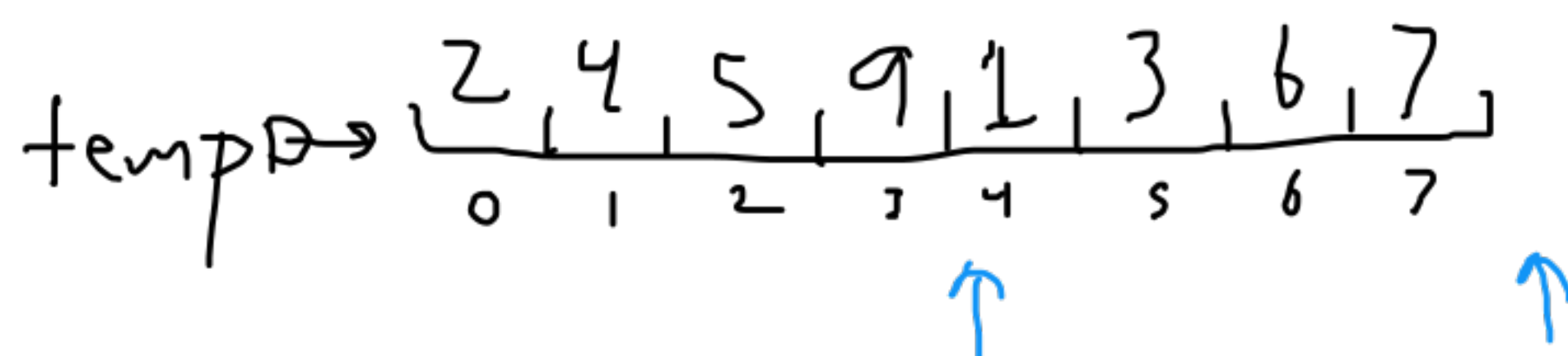
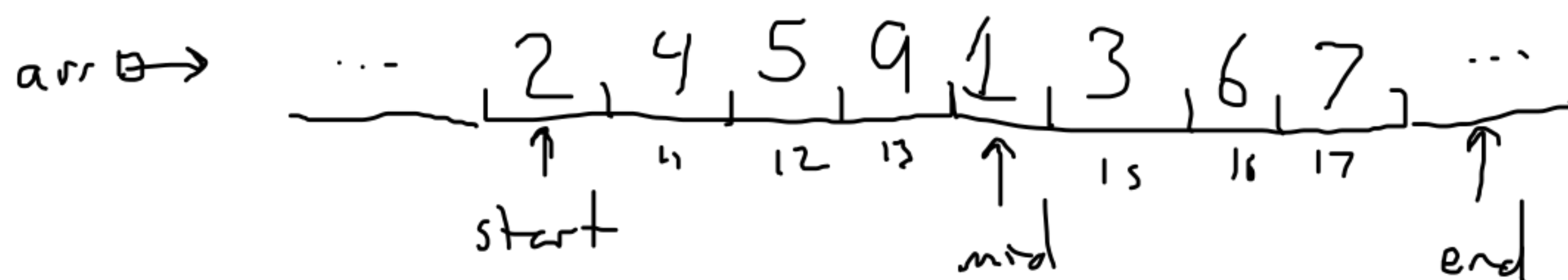
$$= s + \frac{1}{2}e - \frac{1}{2}s = \frac{1}{2}e + \frac{1}{2}s = \frac{(e+s)}{2}$$

# Mergesort Code



$$mid = \frac{(10+18)}{2} = \frac{28}{2} = 14$$

∴ (do sorting recursively)



# Merge sort Analysis

merging  $n$  items:

- copy  $n$  items to temp

$$O(n)$$

- copy  $n$  items from temp  
back to arr

$$O(n)$$

- increment dest  $n$  times

$$O(n)$$

- increment  $from1$  &  $from2$  a  
total of  $n$  times

$$O(n)$$

- calculate  $end1$  &  $end2$  & size of temp

$$O(1)$$

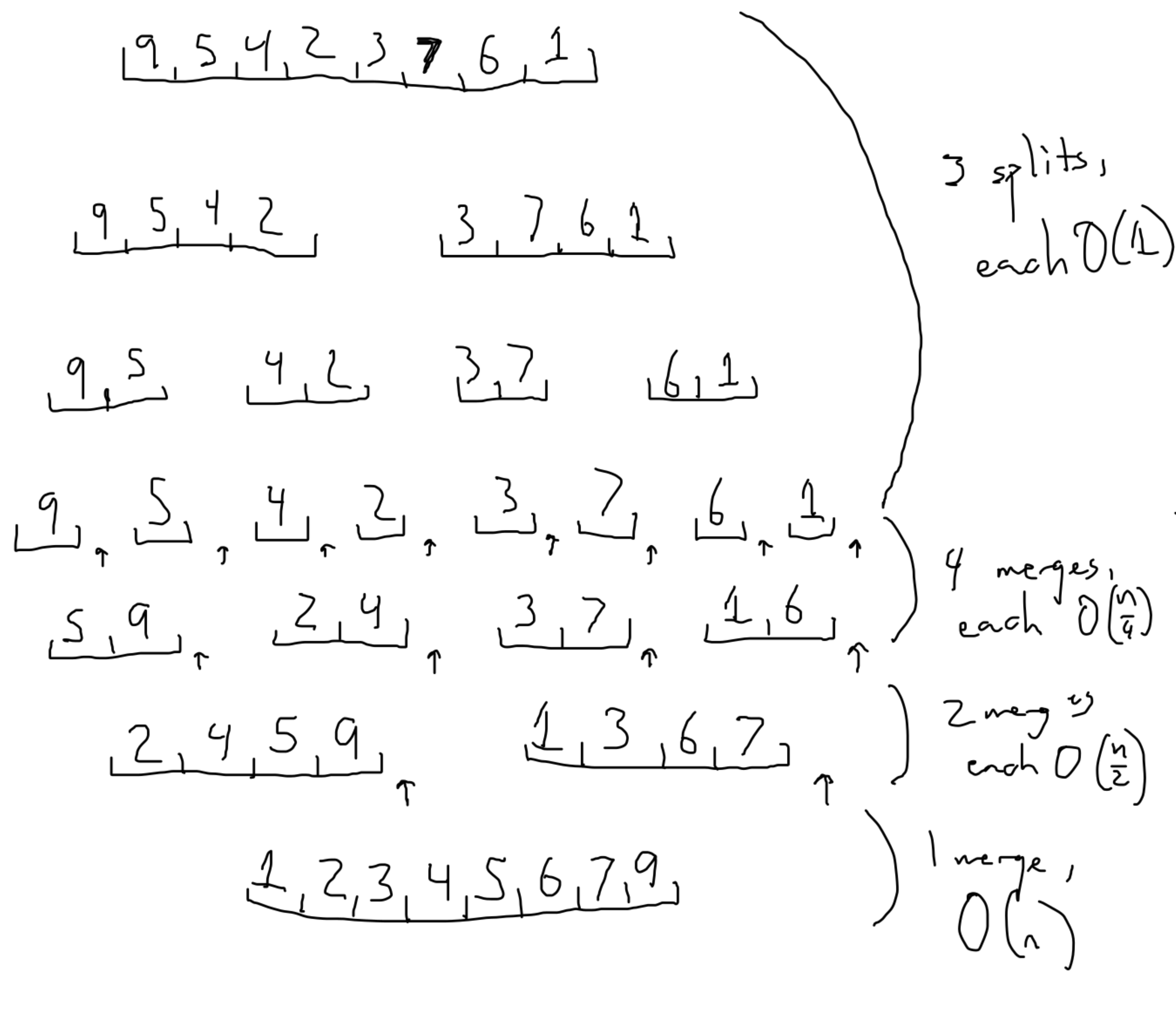
- compare at most  $n-1$  times

$$O(n)$$

---

merge is  $O(n)$

# Overall analysis



we have  $\lceil \log_2 n \rceil$  levels of splitting

$$O(\lg n) \times O(n) = O(n \lg n)$$