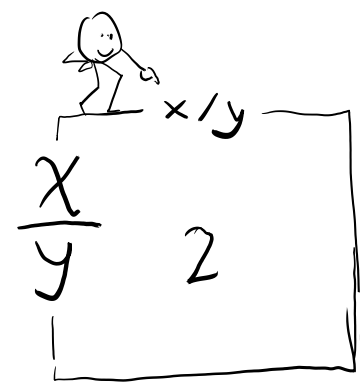


0 1 2 3 4 5 6 7 8 9 10 11 12

+ 1



Thm A

assum  $\neg A$

$\vdots$   
 $\perp$

$\neg A \vdash \perp$

$\therefore A$

thm  
all / none  
 $\subseteq \mathbb{N}$

int/mix

$\mathbb{Z}$   
 $\mathbb{Q}$

Proof.

0. We proceed by contradiction

1. Assum  $\neg A$

2. then  $\dots$  contradiction

3. Bks assum  $\neg A$  led to contradiction

$\neg A \vdash \perp$

neg  
some

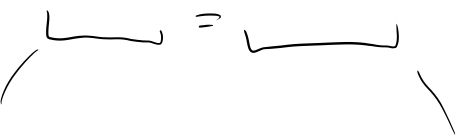
finite

$\in$

strategy  
w.o.p. smallest,  $\exists$  smaller

biggest,  $\exists$  bigger

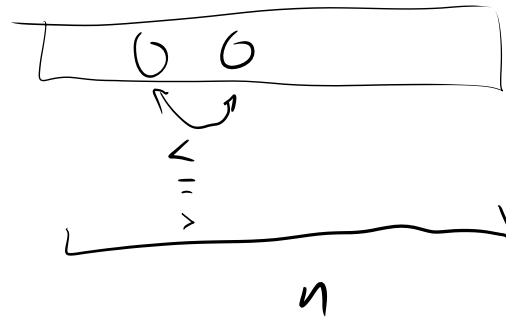
pick  $x \in \mathbb{Q}$  ... FtoA, dit multp of Prim factors



# Impossibility

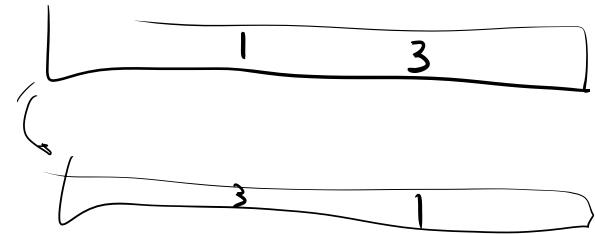
## Comparison-based Sort Algorithm

cannot be faster than  $n \cdot \log_2(n)$



Assume a faster alg exists

→ Show 2 lists cannot be distinguished



Possible

Correctness

induction

no bytes at number  
 ass. x bytes  
 look at x+1

12

13

38

39

→ 56 000 542 181  
 ↘ 56 000 542 182