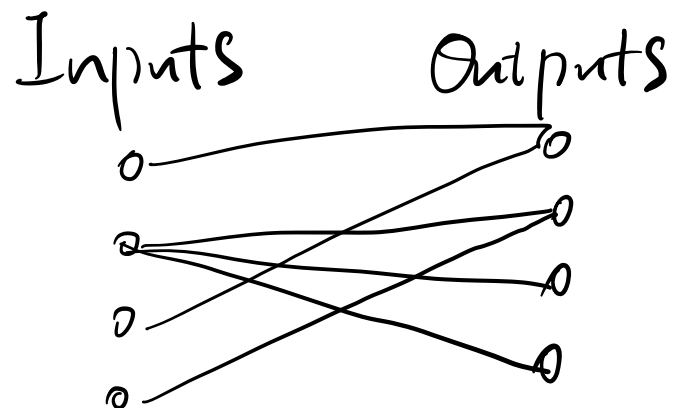


# 6.6606 Lecture 1

Goal: {

- ① Solve Computational problems
- ② Correctness
- ③ efficiency
- ④ Communication

Problem



- general problems
  - arbitrarily sized inputs

Algorithm  $f: I \rightarrow O$

for Birthday problem:

- maintain record
- Interview students in some order
- check if birthday in record

- if so return pair
- add new students to record
- Return None

## Correctness

Inductive Hypothesis: if first  $k$  students contain match alg returns a match before interviewing students  $k+1$

Base case:  $k=0$  ✓

Assume IH true for  $k = k'$

{ if  $k'$  contains match  $\rightarrow$  already  
returned by Induction  
else if  $k'+1$  contains match

alg  $k'+1$  against all students

Efficiency

operations

Don't measure time, instead count ops

expect performance to depend on size of inputs ( $N$ )

-  $O(\cdot)$  upper bounds

$\Omega(\cdot)$  lower bounds

$\Theta(\cdot)$  both

Model of Computation

