CompSci 161
Winter 2023 Lecture 1:
Finding a Celebrity (continued)

What is a celebrity?

- Within a group of people G
  We say a person p s a celebr ty (famous) iff:
  - Everyone knows who p is
    (celebrities must be known by everyone)
  - Person p does not know who anyone else is
- Person p might be a celebrity within G
  - How can you check?
  - What actions can we take?

3 Who is a Celebrity?

$|G| = n$

- Checking if person p is a celebrity:

```
for each person x in G-{p}
    if p knows x
        return false
    if x does not know p
        return false
return true
```

2 questions

$n-1$ people: $2n-2$ questions

▷ Is there a celebrity in group? $2n^2 - 2n$

```
for each p ∈ G
    check if p is celebrity
```

4 Finding a Celebrity

- The previous solution was "brute force"
- Can we do better?
- Things to look for:
  - Did we repeat work?
    (Work that was needed, but was done twice)
  - Did we do unnecessary work?
    (work that we could have done without)

5 Finding a Celebrity

Given group G, is there a celebrity? If so, who?

G' = copy of G

while $|G'| > 1$

select a, b distinct and arbitrary from G'

if a knows b

remove a from G'

else remove b from G'

} $n-1$ questions total

$p \leftarrow$ only one left in G'

Check if p is celebrity } $2n-2$ qs

6 Finding a Celebrity

- Previous solution assumes at most one celebrity
- Would a group have two or more?

Suppose FSOC a group could

let a, b be two distinct celebs

does a know b?

If yes: a not celeb $\rightarrow\leftarrow$

If no b not celeb $\rightarrow\leftarrow$