

473: Notes on Day 7 slides:

Slide 4 Another Induction Example:

Base case. $P(1)$, 3 people. Suppose A and B are the closest pair, and C is the third person. Since all of the distances are different, the distances between A and C, and between B and C are strictly larger than the distance between A and B. Thus A and B throw pies at each other, and C is the survivor.

Induction step. Assume that $P(k)$ is true (in every pie fight with $2k+1$ people, there is a survivor). Show that $P(k+1)$ is true (in every pie fight with $2k+3$ people, there is a survivor).

Let A and B be the closest pair in this group of $2k+3$ people. They throw pies at each other.

If someone else throws a pie at one of them, then for the remaining $2k+1$ people, there are only $2k$ pies to hit them, so someone survives.

If no one else throws a pie at A or B, then the other people comprise a $2k+1$ pie fight, which has a survivor, by the induction assumption.

Slide 14: Euclid's Algorithm: the algorithm

Does it work? It's clear that it works when b is 0.

Is it clear that b will eventually be 0? Yes.

So by Euclid's rule, it works.

Efficiency? Each time, (a, b) gets replaced with $(b, a \bmod b)$. How big of a reduction is that?