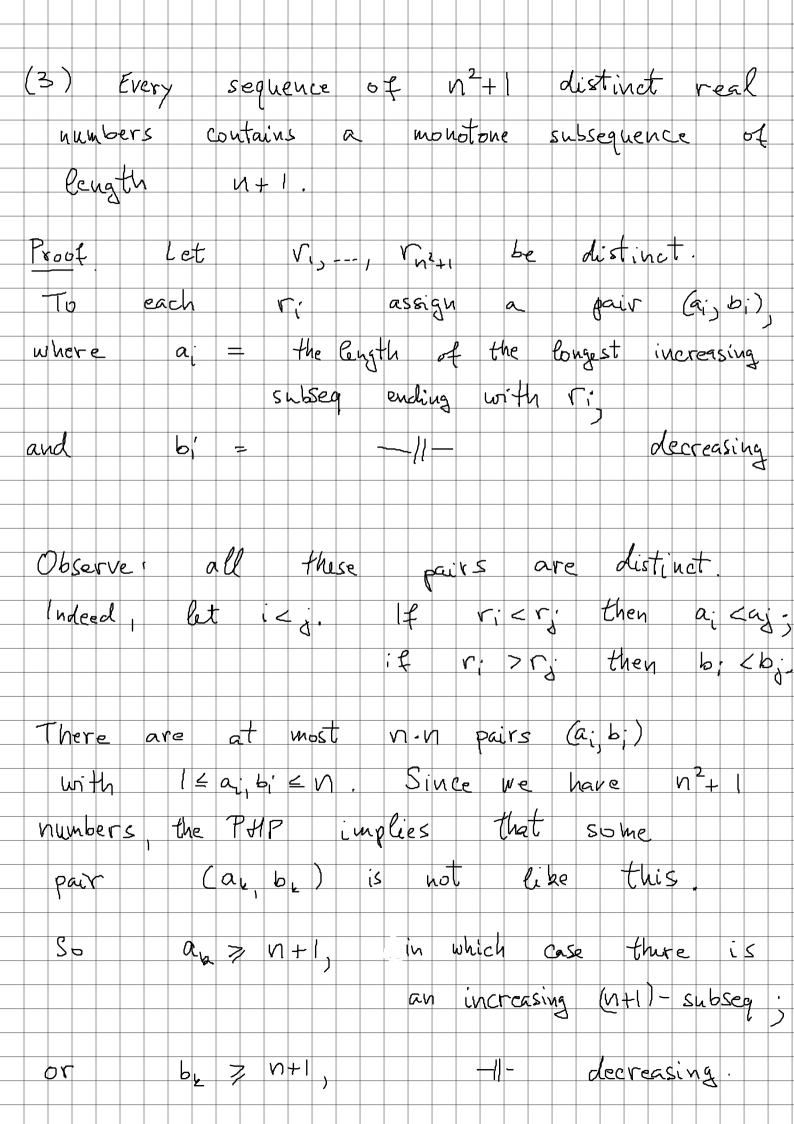
Pigeonhole statements (1) Every (N+1) - subset of ?1 - 2N/ contains a pair of numbers where one divides the other Proof Every natural number can be written as n = m · 2, where m is odd If  $n \le 2N$ , then  $m \in \{1, 3, ..., 2N + 1\}$ Thus if  $n_1, \dots, n_{N+1} \in \{1\}, \dots, 2N\}$  and  $n_1 = m_1 \cdot 2^{1/2}$ , the N+1 odd numbers  $m_1, \dots, m_{N+1}$  belong to a set of size NPigeonhole principle: there are niky such that m; = m; . Then ni divides n; (2) Given 5 points on a sphere, there is Proof. Picz Z points. There is a great circle ("equator") through them diving the Sphere into two hemispheres By the PHP one of them contains at last 2 of the remaining 3 points. So this nemisphere contains at least 4 points.



## Monty Hall

- · there are 3 doors: 2 goats & 1 car.
- · the host Shows where the car is.
- · the contestant points to a door, say no l.
- the host opens one of the other doors, revealing a goat.
- . Should the contestant stick with her choice?

There are 3 scenarios:

After the contestant points to Door Wol, the host opens 2 or 3 in 1st scenario, 3 in 2nd one, and 2 in 3rd one.

If she changes her choice, she wins in the second two scenarios, so in 2 out of 3 cases.