N prisoners at least N times to the switch room.

① When the initial state of the switch is off, assign one person as the counter. His counter is 1 at first.

The solution is:

when the counter person enter the room, if the switch is off, he will do nothing, otherwise increment his count.

counter
- on → turn it off and count ++
- off → continue

Others
- on → continue
- off → first time off, turn it on
  otherwise do nothing

When the counter person reaches P, can make an announcement that all persons have already entered the room.

If the initial state of switch is unknown

counter
- on → turn it off, count ++

- off → continue

Others
- on → continue
- off → first two times, turn it on

Finally, when count reaches $2p-1$, announce that all the persons have already entered the room.