$\exists x \; P(x)$

$\exists$ an integer x s.t. $\sqrt{x}$ is rational

$x = 4 \quad \sqrt{4} = 2$

"constructive" proof

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non-constructive existence pf

"$\exists$ x, y both irrational s.t. x^y is rational"

$x = \sqrt{2}, \; y = \sqrt{2}$

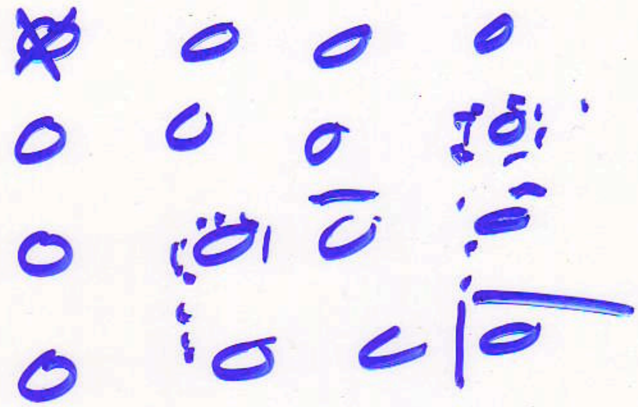
$(\sqrt{2})^{\sqrt{2}}$

$x = (\sqrt{2})^{\sqrt{2}} \quad y = \sqrt{2}$

$x^y = \left((\sqrt{2})^{\sqrt{2}}\right)^{\sqrt{2}} = (\sqrt{2})^{\sqrt{2} \cdot \sqrt{2}} = \sqrt{2}^{\,2} = 2$

"Chomp"

Person →

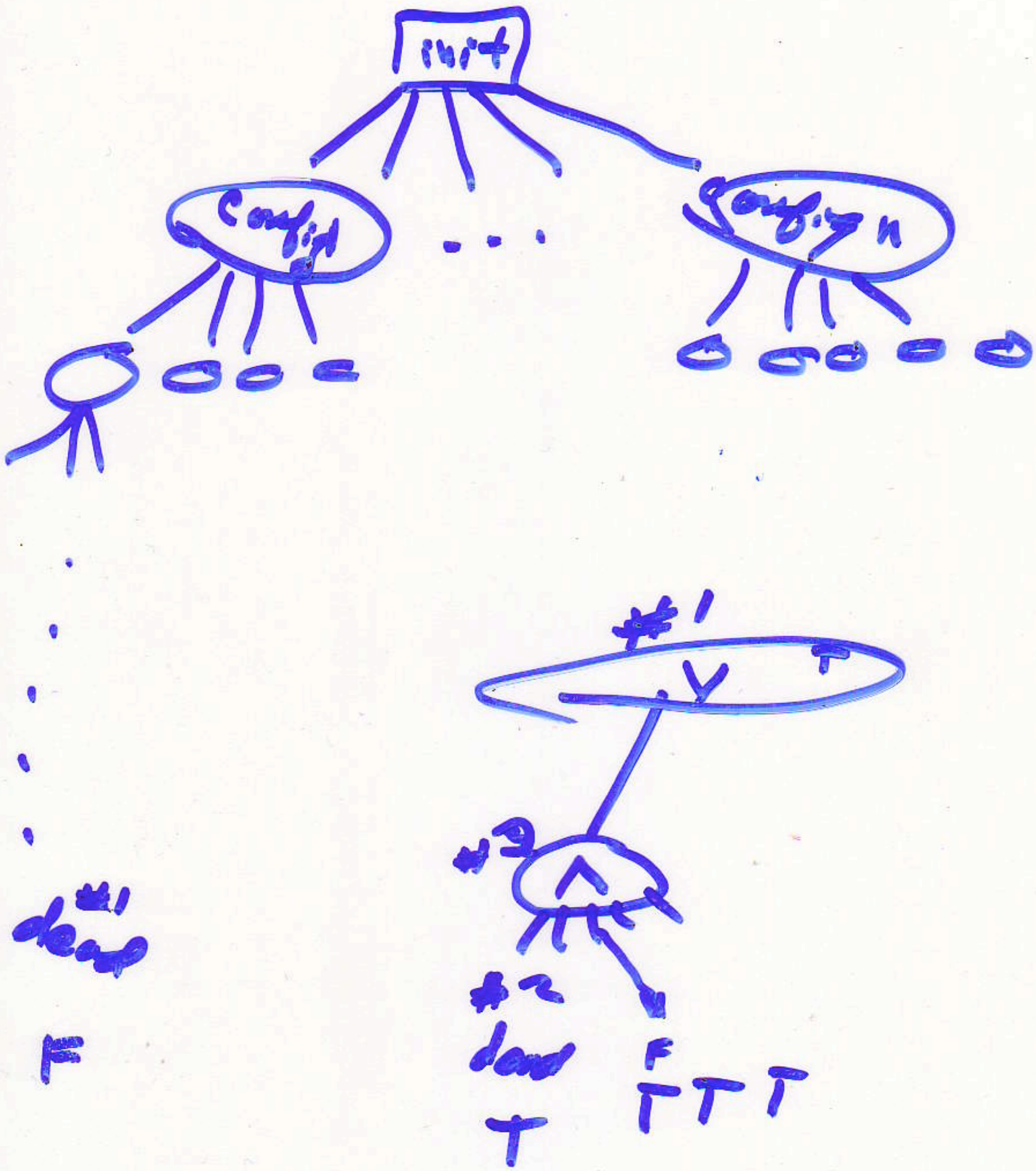


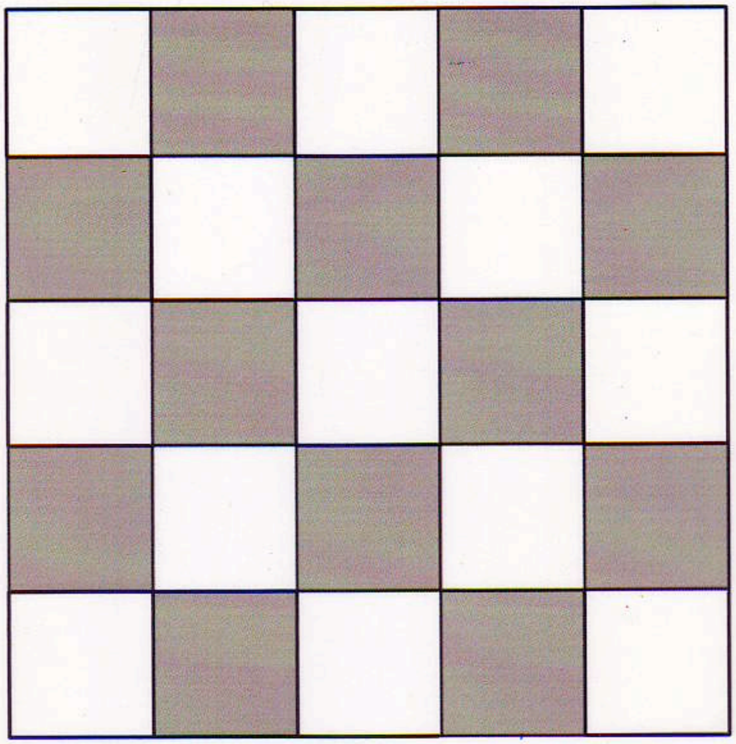
Rules

- 2 players
- your turn: pick a cookie, + all below & right of it
- whoever takes last cookie loses & dies (yes, rated "M" for mature violence...)

Q: Does player 1 have a winning strategy?

A: Yes! but non constructive...


init
config 1
. . .
config n
#1
dead
F
#1
∨
T
#3
∧
#2
dead
T
F
T T T

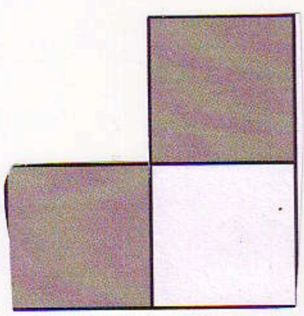


Various Questions:

What kinds/shapes of checkerboards can be tiled with

(a) dominoes

(b) tri-ominoes



P(n): any $2^n \times 2^n$ board missing any one square can be tiled with 'L's.

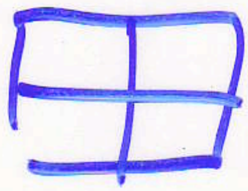
$P(n) \to P(n+1)$

allows hypothetical tilings of $2^n \times 2^n$ boards to be used to build $2^{n+1} \times 2^{n+1}$ tiling

Basis

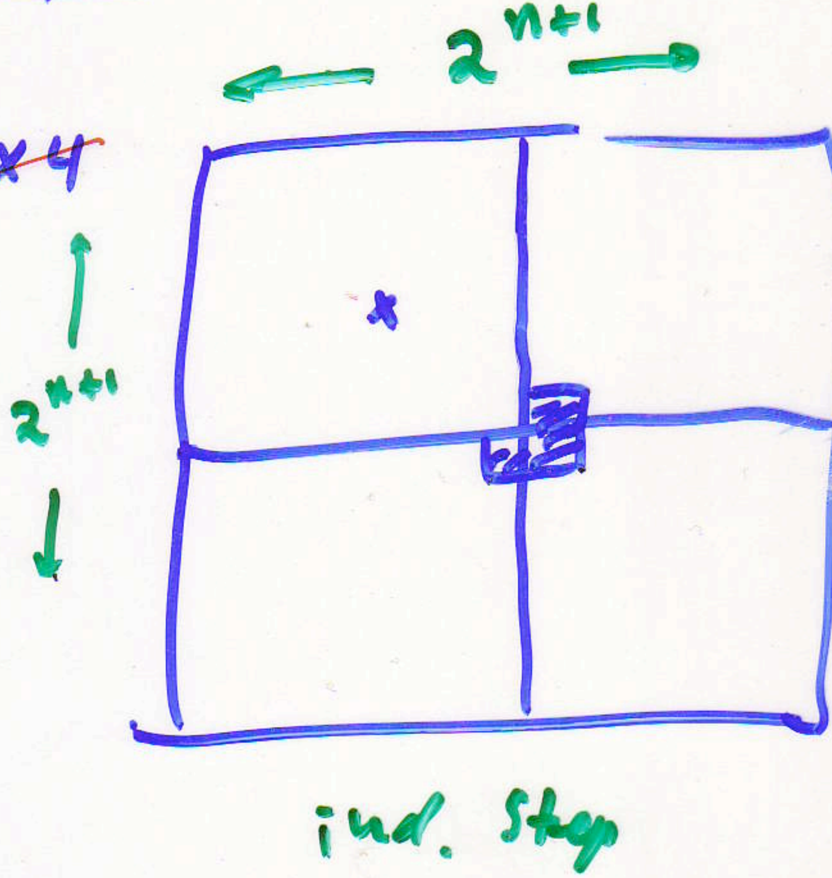
$n = 0$

$n = 1$



~~$n = 2$~~ ~~4×4~~

$2^{\overset{n+1}{\cancel{k}}} \times 2^{\overset{n+1}{\cancel{k}}}$



ind. step

$\underline{\forall n}\ P(n)$