2048 is NP-Complete

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Original game:

- 4x4 board
- $\{\leftarrow, \rightarrow, \uparrow, \downarrow\}$
- New $\{2, 4\}$ each turn
- $2^i + 2^i \Rightarrow 2^{i+1}$
- Goal: 2048

Variant studied:

- Big board
- No new tiles
- Goal: ≥ 256
- $\in$ NP (by Chris Chen)

Result:

- $\in$ NP-hard $\Leftarrow$ $\geq$ 3SAT

Building Block of Reduction