Games, graphs, and machines

October 23, 2024

A bit of review: N/P labelling

- P if sink state
- N if an immediate successor that is P
- P if all immediate successors are N

A bit of review: Grundy labelling

- 0 if sink state
- mex of immediate successors

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- 0 if sink state
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Important properties:

1. Grundy label 0 if and only if P state.
2. $\text{label}(G + H) = \text{label}(G) \oplus \text{label}(H)$.

A bit of review: how to win?

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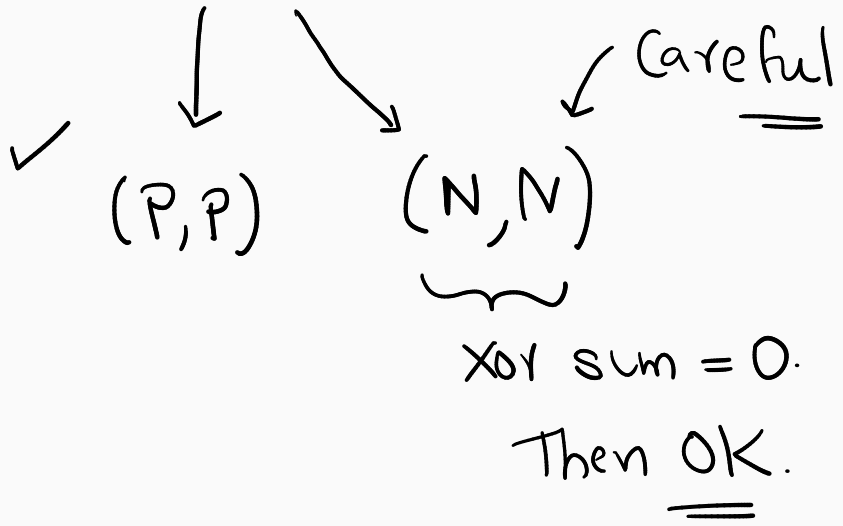
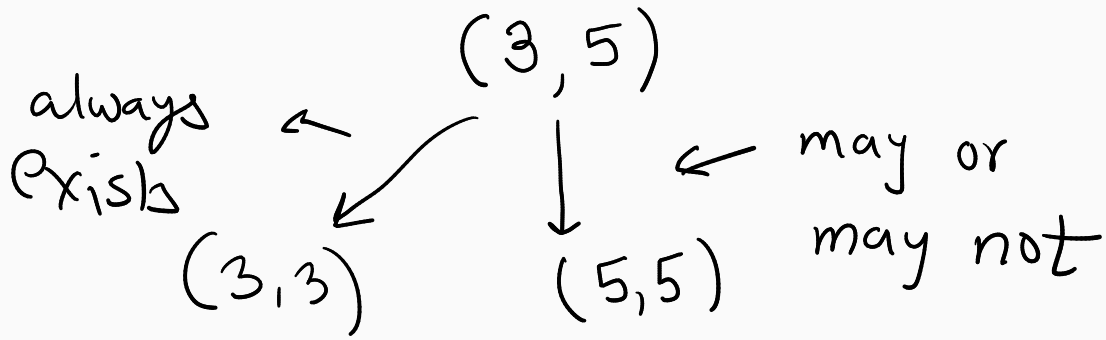
- For example:
  1. In $G + H$, how to move from an (N, P) position?



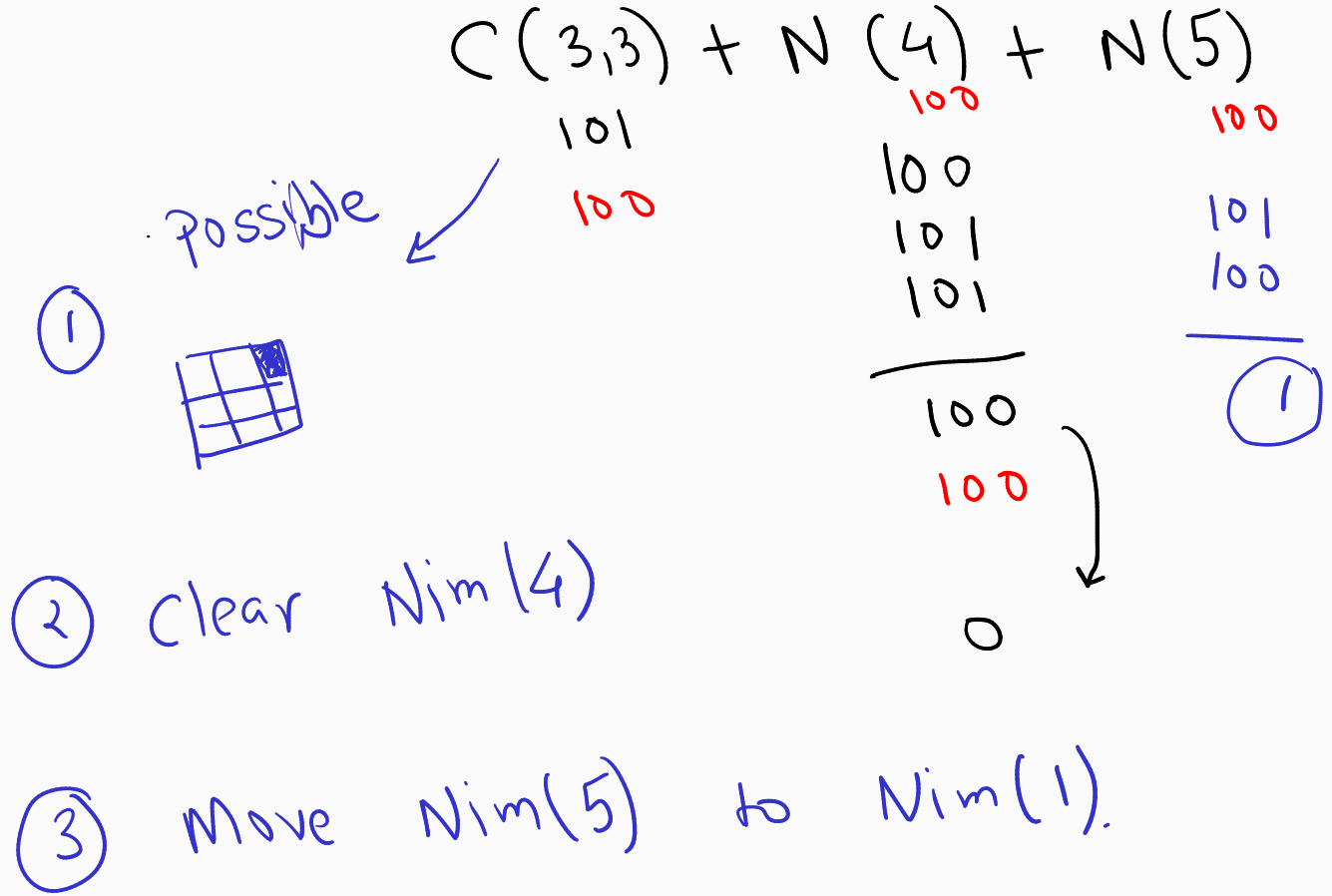
A bit of review: how to win?

- Move to a P position = Move to Grundy label 0.
- For example:
  1. In $G + H$, how to move from an (N, P) position?
  2. What about an (N, N) position?



Example

What are the winning moves of Chomp$(3,3)$ + Nim$(4,5)$ (if any)?



Fun aside: misere play

The player who cannot make a move wins!

For more fun and games –