



NIM

TeenTech

15 June 2022

What is a game?





What is nim?

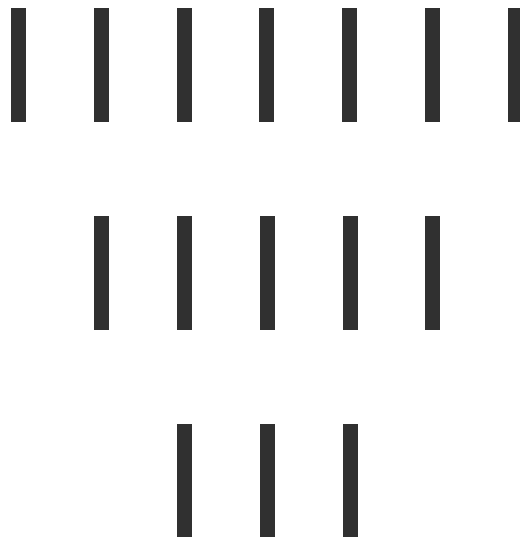
Objective: Take the last match

Rules

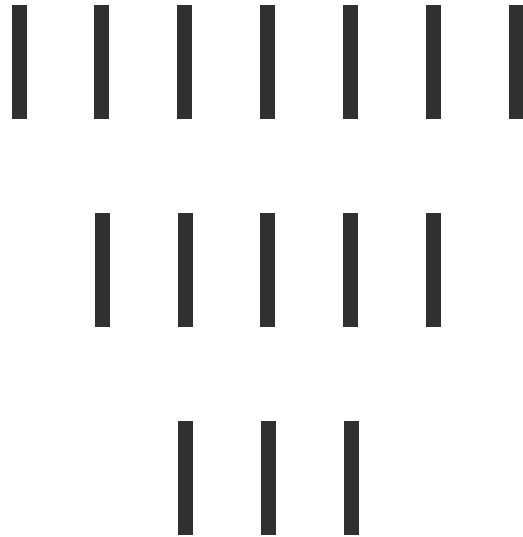
- Start with three piles, 7, 5 and 3
- Two players take turns
- In each move you take one or more matches from only one pile

Pieces

Piles of matches



Nim





What winning moves did you spot?



5 5

4 4

3 3

2 2

1 1

3 2 1

3 4 7



How to win at nim

Make winning moves

Avoid losing moves

Make you opponent make losing moves

Don't let your opponent make winning moves



What are the winning moves?

752 743

653 642

541

321

55

44

33

22

11



Nim sums...

7	111	6	110	4	100
5	101	5	101	3	011
2	010	1	001	2	010
	000		010		101



Coding Nim

```
from random import choice

def computer_move(board):
    moves = legal_moves(board)
    winning_moves = list(filter(is_winning, moves))
    if winning_moves == []:
        return choice(moves)
    else:
        return choice(winning_moves)
```



How to win at chess

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State and behaviour

design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

