Game Theory

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Class Discussion

Nim is a mathematical game of strategy in which two players take turns removing objects from distinct heaps. On each turn, a player must remove at least one object, and may remove any number of objects provided they all come from the same heap. The player who can't move loses.

Game Theory

Exercise 1. Explore the game of Nim.

Exercise 2. Game: one heap, and the number of objects that can be taken is 1 or 2. Players take turns, and the player who can't move loses. Who wins? Same game, but the number of objects that can be taken is any number between 1 and n.

Exercise 3. There are two piles with candy. One pile has 20, the other has 21 pieces. In one move a player can eat a pile and divide the other pile into two (not necessarily equal) piles. The person without a move loses. Who wins, if there are two players total?

Exercise 4. We start with the number 60. In one move a player subtracts the number by one of its divisors. The person who gets to zero loses. Who wins, if there are two players?

Exercise 5. Analize the game of tic-tac-toe.

Exercise 6. There are nine cards with numbers 1,2,3,4,5,6,7,8,9 written on them. On each turn a player takes a card. The first player to get three cards that sum to 15 wins. Who wins?

Exercise 7. Two players play a game. On his/her turn a player can write down an integer between 1 and n inclusive. The next player can't write a number that is a factor of an already written number. The person who can't move loses. Who wins?