

Fair Division

Cake Cutting Algorithms: Be Fair if You Can

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Overview

1. Introduction to Fair Division

2. Cut and Choose

3. Fair Division for n

3.1 Banach-Knaster Last Diminisher

Introduction

Imagine two people want to share this cake.



Introduction

- The cake is complicated
- The two people may value different parts of the cake differently

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- The cake is complicated
- The two people may value different parts of the cake differently
- Can we come up with an algorithm where both people are happy?

Cut and Choose

Algorithm

1. Player 1 cuts the cake into what they believe is half
2. Player 2 chooses the piece which they think is better

Proof of Correctness

1. Player 1 receives $\frac{1}{2}$ of the cake
2. Player 1 values Player 2's allocation to also be worth $\frac{1}{2}$

Proof of Correctness

1. Player 1 receives $\frac{1}{2}$ of the cake
2. Player 1 values Player 2's allocation to also be worth $\frac{1}{2}$
3. Player 2 received the piece which they thought was better
4. Player 2 must value their piece to be at least $\frac{1}{2}$ of the cake

Banach-Knaster Last Diminisher

Multiple Columns

Heading

1. Statement
2. Explanation
3. Example

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Meeting 2

Agenda

- Stromquist Envy-Free Moving Knife for $n=3$
- Austin's Perfect Division for $n=2$
- Ideation