On Connected Strongly-Proportional Cake-Cutting

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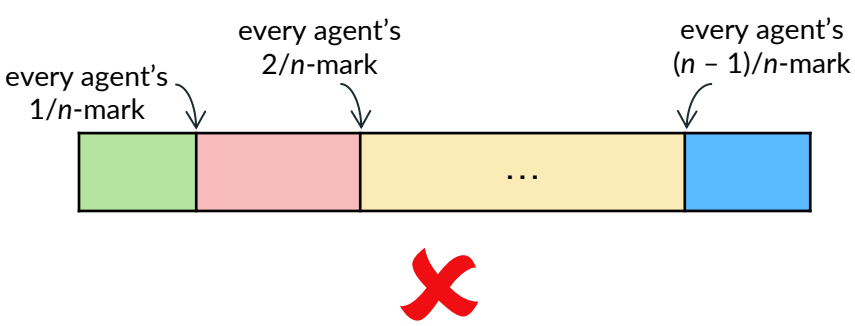
Background

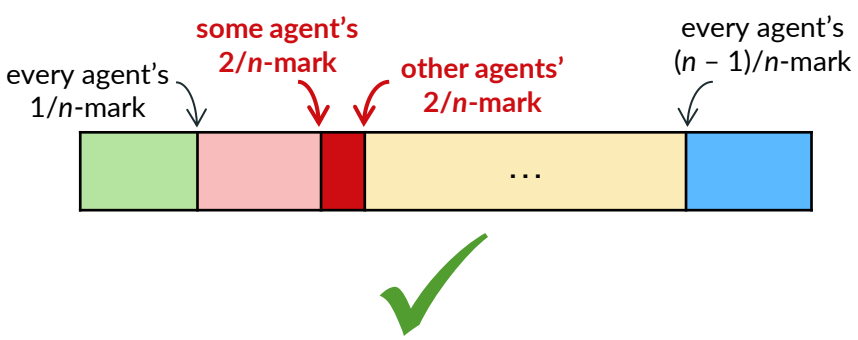
- **Cake-cutting:** fairly dividing a resource (cake) among several agents
  - Cake is **divisible** and **heterogenous**
  - Agents may have **different entitlements**
- **Connectedness:** each agent should have a **single piece** of cake
- **Fairness notion: Strong-proportionality**
  - Each agent's piece of cake is worth **more than** their entitlement
- **Goal:** determine if a **connected strongly-proportional allocation** exists



Results

- **Hungry agents, Equal entitlements:** $\Theta(n^2)$ queries





- **Lower bound:** $\Omega(n\,2^n)$ queries
  - Even for **equal entitlements** (but non-hungry agents)
  - Even for **hungry agents** (but generic entitlements)

- **Upper bound:** $O(n\,2^n)$ queries