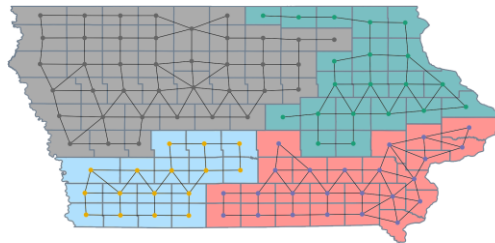
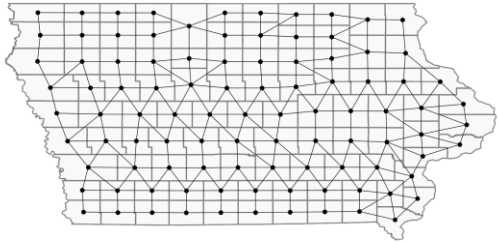


Math 195: Math of Political Districting

Claremont McKenna College, Fall 2022

Monday/Wednesday, 1:15-2:30pm

Instructor: Sarah Cannon



The problem: How political districts are drawn can have a profound effect on who's elected. Those drawing the districts can give advantages to certain groups, a process known as gerrymandering. When and where is gerrymandering occurring, and what quantifiable effects is gerrymandering having?

How Math Can Help: Several mathematical concepts have been applied to try to understand this complex problem, such as the efficiency gap, ecological inference, ensemble analysis, and more. These have their foundations in mathematical concepts related to statistics and probability.

Applying it in practice: Applying these mathematical concepts to real-world situations is a messy and challenging, process, with lots of steps where bias can be potentially introduced. In this class we'll study both the clean, neat mathematical ideas, as well as the messiness that arrives when applying these ideas in practice.

Format: A mix of reading, discussion, math, coding, and data. One class per week will be a discussion of relevant readings from the course textbook, academic research papers, popular articles, court cases, and other sources. One class per week will be a more traditional math class, focusing on the mathematical concepts behind the work currently being done on redistricting.

Topics:

- How districting works in the US
- Dual graphs and partitions
- Statistical measures of fairness
- Mathematical compactness
- Entropy
- Ecological Inference
- Markov chains and random sampling
- Ensemble Analysis

Textbook:

<https://mggg.org/gerrybook.html>

Prerequisites:

- Linear Algebra (Math 60 or 60C)
- An introductory python course (e.g. CSCI 40 CM, CSCI 5 HM, CSCI 4 PZ)