Introduction: One of the first traditional districting criteria in the US is population balance or 'One Person, One Vote' standard, which was made mandatory by the Supreme Court's ruling in Baker v. Carr in 1962. At the congressional level, this is usually interpreted as requiring that districts differ by at most 1 person (although even this leaves a little ambiguity between $\max_{i,j} |P_i - P_j| = 1$ and $\max_i |P_i - \overline{P}| = 1$ once rounding is considered). Iowa is an exception to this rule, due to its insistence on not splitting any counties (West Virginia has a similar rule/exception).

Goal(s): Explore some of the initial tradeoffs in redistricting and compare basic properties of feasible plans. Build intuition for optimization methods. Practice partisan symmetry computations.

Activity:

1. Navigate to https://districtr.org using your browser
2. Scroll down to the map of the US and click the outline of Ohio
3. Click the purple button that says: "4 Congressional Districts Built out of 2020 Counties"
4. Use the interface to draw a map for Iowa, attempting to minimize the population balance between the districts.
   - The horizontal bars in the lower right panel show the current population of each district
   - The total deviation is also displayed under this panel
   - Can you create a plan where the maximum deviation is under 1%?
5. Once you've got a plan you are happy with, use the evaluation panels to compute the following information about your districts using the 2016 vote totals:
   (a) Population imbalance: _____
   (b) Highest Percentage of White Residents: _____
   (c) Expected Number of Democratic Seats: _____
   (d) Highest Democratic Voting Percentage: _____
   (e) Mean-Median Score: _____

Discussion Questions: Once you've created your map, use the following questions to reflect on this exercise (we'll also discuss them together in a little bit):

1. Do you think your plan would be fair?
2. Where did you start the line drawing process?
3. Did you ever have to start over or delete assignments?
4. What factors did you consider every time you assigned a new county?
5. Did compactness considerations constrain your choices?

After looking at some of the other maps around the workshop

6. What do you observe about the most 'balanced' plans?
7. Is there a unique 'fairest' plan?

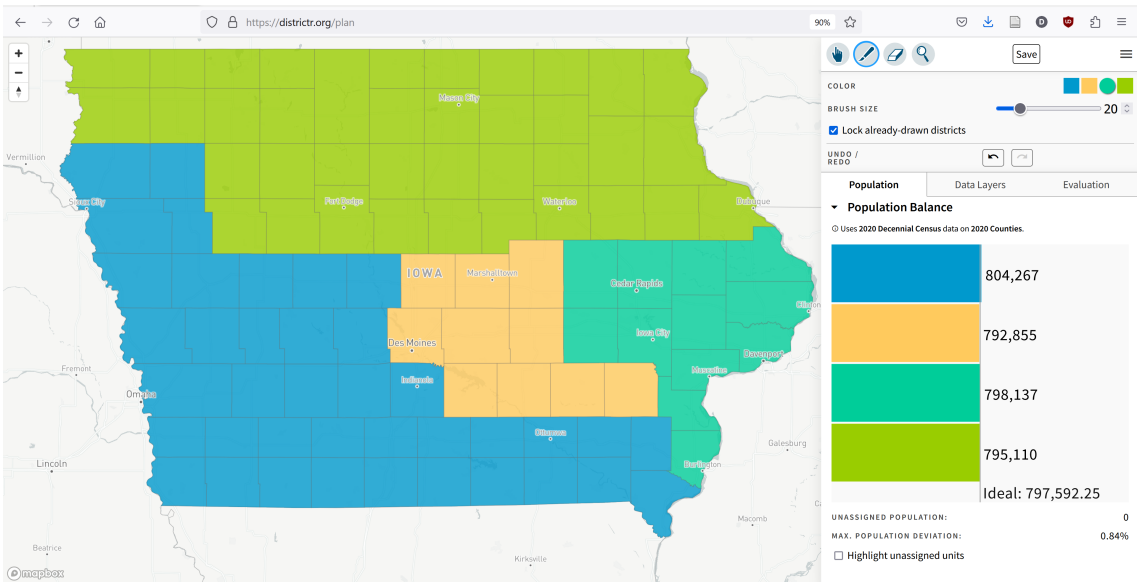

Figure 1: An example Districtr map in Iowa with .84% population deviation. Can you beat this?

Voting Age Population by Race

COMPARE: White VAP

WITH: Hispanic VAP

AND: Black VAP

	WVAP	HVAP	BVAP
1	87.8%	5.7%	1.8%
2	80.9%	7.1%	4.5%
3	83.9%	4.8%	5.2%
4	89.2%	4.4%	2.7%
Overall	85.5%	5.5%	3.5%

Election Details

2016 President Election

two-way vote share
Overall

	Democratic	Republican
Vote Share	44.94%	55.06%
Seat Share	50%	50%

By District

	Democratic	Republican
1	36.02%	63.98%
2	51.51%	48.49%
3	53.33%	46.67%
4	38.99%	61.01%

Figure 2: Here are the demographic and partisan breakdowns for the districts above. What stands out to you?