This research focuses on the mathematics of gerrymandering. Gerrymandering refers to how political parties draw district boundaries to give them better odds at receiving a majority during congressional elections. Every 10 years district boundaries in the United States are redrawn for congressional elections by the current majority party. With such change in political cartography, redrawing district boundaries not only affects who wins but also the people who live within them. With such loosely defined criteria for redistricting, we seek to quantify the process of redrawing district lines to determine when this partisan process becomes an act of manipulation and exclusion.

We will using the The Metropolis Hastings (M.H.) Algorithm to produce a random walk that has a stationary distribution that will be the probability distribution of all possible districting plans for a given U.S state. By collecting congressional maps and election results, we implement the M.H. algorithm in python to produce sample spaces for Washington State and Iowa. The random walk model will consider local and federal redistricting requirements using self-defined parameters which measure: compactness of districts, population division, division of counties, and minority voter populations. We will simulate election results with respect to our sample districts and compare the simulated outcomes with actual district maps and their election results. This study will help to determine if the current redrawn maps legitimately reflect the people they purport to represent or if they are manipulations and subversions of our democratic process.

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## **Research Connections**

**Population Health Recognition Awards for UW Undergraduate Research Symposium Presenters**

The Undergraduate Research Program has again partnered with the UW Population Health Initiative to create recognition awards for innovative, interdisciplinary, and well-presented research relevant to population health. Symposium presenters from all three UW campuses may apply. Selected entries will receive a $100 gift certificate.

If you would like to be considered:

- Submit a 250-word description of how your research aligns with the theme of population health below.

- Inform your mentor(s) that you are applying for this recognition and share your entry with them.

- If you are part of a group presentation, work with your group members in developing this entry and state in your entry that this submission is on behalf of a group project.

For more information on the Population Health Initiative, visit: [www.washington.edu/populationhealth/](http://www.washington.edu/populationhealth/)