

Math of Elections #9

Gerrymandering

Definitions

- A **district** is a collection of voters in a single area. We assume a district must be *contiguous* (i.e. connected), and that each voter is in exactly one district.
- **Redistricting** is the process of redrawing the boundaries of the districts. This process does *not* move the location of individual voters but can change who is together in each district.
- **Gerrymandering** is the process of redistricting to get a specific result.

Exercise

The following map of voters describes their preferences between Party A and Party B.

A	A	A	A	A
B	A	A	A	B
B	A	B	B	B

1. What percent of the voters support Party A? What percent support Party B?
2. Suppose each *column* of 3 voters forms a district. How many districts would each party win? Which party would win the majority of the districts?
3. Find a way to gerrymander the map (i.e. redraw the districts) to form districts of size 3 so that the other party now wins the majority of the districts. Draw the boundaries of your districts on the map above. *Remember that the districts must be contiguous.* How many districts would each party win this time?

Exercise

The following is a map of 60 voters describing their preferences between Party A and Party B.

A	A	A	A	A	A	A	A	A	A	A	A
A	A	B	A	A	A	B	B	B	A	B	A
A	A	B	B	A	B	B	B	A	A	B	A
A	B	B	B	B	B	B	A	A	A	A	A
A	B	B	A	B	B	A	A	A	B	A	A

1. What percent of the voters support Party A? What percent support Party B?
2. Show that you can make 12 districts, each with 5 voters, so the majority party wins every district. Draw the boundaries of your districts on the map above.
3. Find a way to gerrymander the map into 12 districts of 5 voters so that the minority party wins the majority of the districts. Draw the boundaries of your districts on the map below.

A	A	A	A	A	A	A	A	A	A	A	A
A	A	B	A	A	A	B	B	B	A	B	A
A	A	B	B	A	B	B	B	A	A	B	A
A	B	B	B	B	B	B	A	A	A	A	A
A	B	B	A	B	B	A	A	A	B	A	A

Exercise

Revisit the map of 60 voters in the last exercise. Now suppose that there is to be 10 districts each with 6 voters. Explain why it is no longer possible to gerrymander the map so that B wins the majority of the districts.