Notes: Day 1, January 22nd

Today we mostly discussed methods of voting. The example we started with was voting on what type of pizza was the best: cheese, mushroom or pineapple. Here are a list of the methods we came up with:

1. Elias' first method is known as **plurality**. It is the most common voting method used in practice. It ranks the options by the number of first place votes each receives.
2. Elias' second method ranks the voters by the number of last place votes. The winner is the option that receives the *least* number of last place votes. This is known as **anti-plurality**.
3. Eric's *point system* gives a score to each option, based on their position in each voters ranking. An option gets one point for being ranked first, two for being ranked second, and so on. The lower the score the better.
4. Liza's variation on Eric's method was to have some people votes count more than others. (comment: this idea could modify a lot of these voting systems).
5. Addison's *bracket method* first pairs up two of the options, say mushroom and pineapple and see which wins between them. The winner goes on to face the last option, in this case cheese, and everyone votes on those two to decide the winner.
6. Emily brought up a pairwise comparison method. Compare each option to all the others and see who would win that pairwise match-up. The options are ranked based on how many of these pairwise match-ups they win.
7. A variation on this is to keep track of not just who won each pairwise match-up but also by how much. Options are scored by adding up the amount they won each pairwise match-up by.
8. Kitkat suggested the spectrum method which allows everyone to rank the options from 1 to 10 and then we add the scores up to rank the options.
9. Instant-runoff voting works by eliminating the option with the least number of first place votes, removing that option from the voters lists, and then repeat the process until only one option is left.
10. A variation on this called **Coombs method** instead eliminates the option with the most number of last place votes at each stage.
11. Here is another voting method described by Elias: To score each option, only look at the number of first and last place votes it received. First place votes are 1 point, and last place votes are 3 points. Then average the sum of these points over the number of people who voted first or last for that option.

Here are some either obviously problematic or wacky ways to vote:

a) The **dictatorship** method selects one voter and the ranking is based only on their preferences.

b) The Pineapple method simply selects pineapple. More generally, the **monarchy** method selects a single candidate regardless of the votes.

c) The **random number generator** methods selects a winner at random (for whatever version of ransom you want to use).

d) The **all-options-tie** method results in...every option tying.

e) The **most second place votes** method does what it says.

We looked at this example of a set of votes:

4	3	2	6	5	1
P	P	C	C	M	M
C	M	P	M	P	C
M	C	M	P	C	P

We tried out some of our methods to see what topping would win and got a variety of answers. The point method resulted in a tie. We also got a three way tie from the number of pairwise wins method, and it was still a tie when we used the version that keeps track of how much each option won its pairwise match-ups by. Plurality gave the win to cheese, but looking at number of last place votes had Mushroom winning. Instant-runoff first eliminates cheese, and then eliminates pineapple, so mushroom wins.

We ended class by asking which of these systems was best or worst. Emily suggested that it might depend on the context we were voting in. The question seems difficult to answer.