

# Final Project: Applying Voting Methods to a Homemade Survey

## 1 Description of the project

### Summary

For this project, you will conduct a survey with four choices for survey-takers to rank. You will calculate the winner using each of the the voting methods we have learned in this class, along with a new voting method that you create. Then you will discuss which method you think is the most fair to determine the winner for your survey, and why.

### Creating a survey and compiling results

1. **Create a survey of your own with 4 choices.** This can be an online survey using a platform like Survey Monkey, or you can make a paper ballot. The instructions on your survey should be clear, and you need to ask voters to rank the 4 options from best to worst. (In other words, this is a preference ballot.)
2. **Collect results for your survey** from at least 25 people.
3. **Make a preference schedule** using your survey results.

### Create your own voting method

Develop your own method of determining who wins your election. Carefully describe how to determine the winner using words someone who has not taken Math F113X can understand.

### Determining the winners

1. **Determine the winner using the Plurality method.** Also determine who finished second, third, and fourth. Include work and supporting calculations.
2. **Determine the winner using Instant Runoff Voting.** Use the fewest number of last place votes to break any ties. Include work and supporting calculations. Clearly show all rounds, and clearly indicate (with words!) who is eliminated in each round.
3. **Determine the winner using Borda Count.** Also determine who finished second, third, and fourth. Use the fewest number of last place votes to break any ties. Show your work and provide supporting calculations.
4. **Determine the winner using Copeland's method.** Also determine who finished second, third, and fourth. Show your work and provide supporting calculations.
5. **Determine the winner using your own original method.** For example, you could decide a winner using fewest last place votes, or an instant runoff voting system where the candidate with the most last place votes is eliminated. Clearly explain your method and show all your work.

## Further Analysis

Based on the objective of your survey, which of the voting methods you used do think is most fair overall? Which is the least fair? Write a short answer (1-2 paragraphs with at least 10 sentences total) explaining your conclusion. You should not be explaining how the methods work. Rather, you need to explain why the methods are the most fair or the least fair. You need to assess the fairness of all the methods that you used, including your own made up method.

## 2 Project Deliverables

### How to submit

- Your project must have a **Title Page**, containing your name and which project you are completing.
- Your final project must be submitted in class during the final exam period. (Note that you can print out materials at the Student Success Center!)
- Your final project must be typed.
- You should use sentences to describe what each piece of your project is doing and what you are computing: one of your classmates should be able to read your project and understand what you are doing.
- Your final project must be stapled together.

### What to submit

Your final project will have the following sections. Each section should start on a separate page.

1. A section titled **Survey** that describes
  - (a) What you were trying to determine using your Survey
  - (b) A copy of the survey question
  - (c) Your complete preference schedule
2. A section titled **My New Voting Method** that clearly describes your new voting method, using words that someone who has not taken Math F113X can understand.
3. A section titled **Winners** containing:
  - Your preference schedule
  - The winner using the **Plurality** method, with supporting work
  - The winner using **Instant Runoff Voting**, with supporting work
  - The winner using **Borda Count**, with supporting work
  - The winner using **Copeland's Method**, with supporting work

- The winner determined using your **own voting method** along with your results and supporting work

Each subsection above should be indicated with a clear heading.

4. A section titled **Best Method** containing your answer, with justification, to the following question:

“Which of the voting methods you used do you think is most fair overall? Which is the least fair?”

You should assess the overall fairness of each of the five methods you used above. For each method, discuss its strengths and weaknesses. Then determine which method you think is the most fair and which you think is the least fair.

5. A section titled **Survey Results** that shows the results of each voter’s preference ballot. You may present these raw results using a table or spreadsheet, or include the actual ballots.

### 3 Grading

Your project will be graded out of 100 points using the following rubric:

1. Survey Results (10 points)
  - Survey has at least 25 ballots.
  - Survey objective is clearly described
  - Raw data is included as part of your project submission
2. Preference Schedule (10 points)
  - The numbers corresponding to each preference sum to the total number of voters
  - How many people chose each preference is correctly identified
3. Plurality Method (10 pts)
  - Correct identification of the plurality winner
  - Correct identification of the 2nd place, 3rd place, and 4th place winner
  - Supporting computations
4. Instant Runoff Voting (10 pts)
  - Clear description of what happens in each round (including redistribution of votes)
  - Clear communication about who gets eliminated in each round
  - Correct determination of the IRV winner
  - Supporting computations
5. Borda Count (10 points)
  - Clear description of computations

- Correct determination of the Borda Count winner and 2nd place, 3rd place, and 4th place
  - Supporting computations
6. Copeland's Method (10 points)
- List all head-to-head comparisons
  - Correctly determine the winner of all head-to-head comparisons
  - Provide computations supporting the determination of the winner using Copeland's method
  - correct determination of the winner and 2nd place, 3rd place, and 4th place
7. Your own new method (10 pts)
- Provide a clear explanation of what your method is and how to implement it
  - Explain how your method is clearly different from the other four methods
  - Apply your method to determine the winner, and 2nd place, 3rd place, and 4th place
  - Supporting computations
8. Discussion about most fair and least fair methods (20 pts)
- Objective of your survey is clearly described
  - Strengths and weaknesses of each voting method are assessed
  - Clear discussion of which method is most fair and least fair
  - Justification on why you made those determinations
  - Mathematical analysis to supporting the justification
9. Grammar, mechanics, and following directions (10 points)
- Use sufficient words and complete sentences in your discussions
  - Use correct grammar and mechanics in your writing
  - Use words and headings to make it clear what you are answering where
  - Computations presented clearly and legibly
  - Follow the directions