# Single Transferable Vote

**Needed:**

- MATLAB
- Election results in the same format as the sample results excel file in this zip file.
    - Candidate names are not necessary, the default is to number them 1 through n
    - Each row represents one voter. Each voter will rank the candidates 1 through n, with 1 being the highest rank and n being the lowest rank.
    - If Qualtrics was used to collect election data, export your results and you should see the data in this format. Some of the excess rows and columns will need to be deleted- keep only the data shown in the example results file included in this zip file.

**Procedure:**

- Place all of the files in this zip file in the same folder on your computer. Open MATLAB and set this folder as your current folder.
- Open the *STV_run.m* file and enter the file name of your results file and the number of seats to be elected in lines 3 and 4.
- Run the script.

Contact kaitlynarvesen@gmail.com with any questions!

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If more interested:

**How does STV work?**

Instead of having voters select only their top choice, voters rank all candidates from 1 to n (n = number of candidates). Votes are then analyzed to determine the winners.

1. A quota- how many votes are needed to win- is calculated. The method I have used to do this is the droop method: quota = (# votes) / (# seats + 1) + 1
2. Each voter has one vote. Initially, each candidate is assigned a number votes based on how many voters ranked them as their first choice.
3. If any candidate has reached or exceeded the quota, they are marked as a winner. “Excess” votes (votes assigned to a winner that push them over the quota instead of just meeting it) are reassigned to other candidates based on who those voters ranked next. This way, the winner keeps only the number of votes needed to win for the remainder of the process. This step is repeated until all the seats are filled or until there are no more winners.

4. At this point, the candidate with the lowest number of votes is eliminated and *all* of their votes are redistributed to other candidates based on who those voters ranked next. Steps 3-4 are repeated until all of the seats are filled.

**How are votes redistributed?**
When excess votes are redistributed, they are given proportionally to the candidates that those voters ranked next when they voted. Only the voters whose votes are being redistributed are considered to calculate these proportions. In this case, rounding may cause the number of votes to change slightly. When a candidate is eliminated and all of their votes are redistributed, each vote is simply transferred to whichever candidate that voter had ranked next in line.

**Why STV?**
By redistributing votes, the voice of each voter matters more. If your first choice candidate gets eliminated, your vote will go towards your second choice. This lessens the issue of overpowering political parties like we experience in the US- people are afraid to vote for any candidate that isn't a Republican or Democrat because their vote will just be wasted. STV also leads to more proportional representation. It ensures that no matter how the voter population is divided (ex: gerrymandered districts), the party with the most votes gets the most seats, while also guaranteeing that there will still be some representation for minorities. For our use in Longhorn Band, STV prevents having run-offs. In the past, if voters did not reach a certain quota, we would eliminate the bottom few candidates and have another run-off election, and keep eliminating candidates and having run-offs until enough candidates were selected. With STV, everyone only needs to vote once.

**Where is STV used?**
- United States: some city/municipal elections in Massachusetts, Minnesota, California, Maryland, Colorado, New Mexico, and Maine
    - student government elections at Carnegie Mellon, MIT, Oberlin, Reed, UC Berkeley, UC Davis, Vassar, UCLA, Whitman, and UT Austin
    - Legislation (HR 3057), was introduced in Congress in June 2017 that would establish STV for US House elections starting in 2022.
- Ireland and Malta: parliamentary and local government elections
- United Kingdom: national assembly and local government elections in Northern Ireland, local government elections in Scotland
- India, Nepal, and Pakistan: indirect elections (upper house in Nepal and Senate in Pakistan)
- Australia: Senate, various legislative assemblies and councils
- New Zealand: various council, authority, and board elections