This activity is to encourage you to think about issues related to the primaries being held in the run-up to the November 2020 elections as well as the fact that NY City has recently changed from plurality voting to using a system of ballots where voters can rank the candidates rather than being "forced" to vote for a single candidate. (First example due to Warren Smith.)

Question 1. Who do you think should win this election based on the votes of the 57 voters, who produced ballots as indicated? Candidates towards the top are more preferred. Why did you decide the way you did? Can you provide a method of counting the ballots which gives rise to the winner you think should win?
Question 2. How does these collections of ballots differ from the set of ballots for Question 1. Who do you think should win these election based on the votes of the 57 voters, who produced ballots as indicated? Why did you decide the way you did? Can you provide a method of counting the ballots which gives rise to the winner you think should win?

a.

```
A    B    C
C    A    B
B    C    A
17   1    24   15
Voters
```

b.

```
A    B    C
C    A    B
B    C    A
13   5    24   15
Voters
```
Comment:

The notation above, while appealing and for most people self-explanatory, is hard to set in type.

A common alternative for how to show the way people voted is to use this notation:

24 people voted:  $A > C > B$

as the way of showing the first 24 ballots in the prior diagram.

Sometimes, this "inequality" notation is shortened using a convention that more preferred candidates appear to the left, as:

24 people voted:  $A, C, B$

In this notation the last single vote above would be written:

1 person voted:  $C, B, A$
Question 3

Fifty-five voters have produced the following collection of ballots on 5 choices:

```
A    B    C    D    E
D    E    B    C    E
E    D    C    A    A
B    E    D    B    A
A    C    D    E    B
```

Votes: 18 12 10 9 4 2

a. Who should be declared the winner? (Candidates higher up are preferred.)

b. What method did you use in deciding who the winner should be?

c. If a ranking is to be made, rather than selecting a single winner, how would you rank the 5 choices from "highest" to "lowest?"

d. If different reasonable methods of conducting elections lead to different winners what lesson does this have for democracies?

e. If all of the numbers of votes for the 6 kinds of ballots are doubled, does this affect the winner for any of the methods you looked at?

f. If all of the numbers of votes for the 6 kinds of ballots are increased by one, does this affect the winner for any of the methods you looked at?

g. If all of the numbers of votes for the 6 kinds of ballots are decreased by one, does this affect the winner for any of the methods you looked at?