

Instructions: Use correct notation and show all work. Be sure to clearly label all winners of elections.

1. How many ways can you roll six dice?

$$6^6 = 46,656$$

Since repetitions is allowed, we must assume order matters

2. Suppose that a straw poll is conducted about an upcoming election with three candidates with the results shown in the table below. Compute the winner of the election by Plurality with Elimination.

# of Votes	6	2	3	4	2
1 st	C	B 5	B 5	A	A
2 nd	A	A 5	C 5	B	C
3 rd	B	C	A	C	B

Rnd 1: $A = 6$
 $C = 6$
 ~~$B = 5$~~

Rnd 2: $A = 6 + 2 = 8$
 $C = 6 + 3 = 9$

C wins!

(9 needed for majority)

But suppose that when the actual election is conducted the two voters in the last column decide to change their votes and give C their 1st place choice instead, according to the table below. Calculate who won the election now. Is this a fairness criterion violation, and if so, which one?

# of Votes	6	2	3	4	2
1 st	C	B	B	A 5	C
2 nd	A	A	C	B 5	A
3 rd	B	C	A	C	B

Rnd 1: ~~$A = 4$~~
 $B = 5$
 $C = 8$

Rnd 2: $B = 5 + 4 = 9 \leftarrow B \text{ wins!}$
 $C = 8$

This is a violation of the monotonicity criterion since C gained more votes after winning, but then ended up losing because of the vote-switching